THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LIX. No. 1513.] LONDON, MAY 10, 1892. [44TH YEAR. PRICE 6d.

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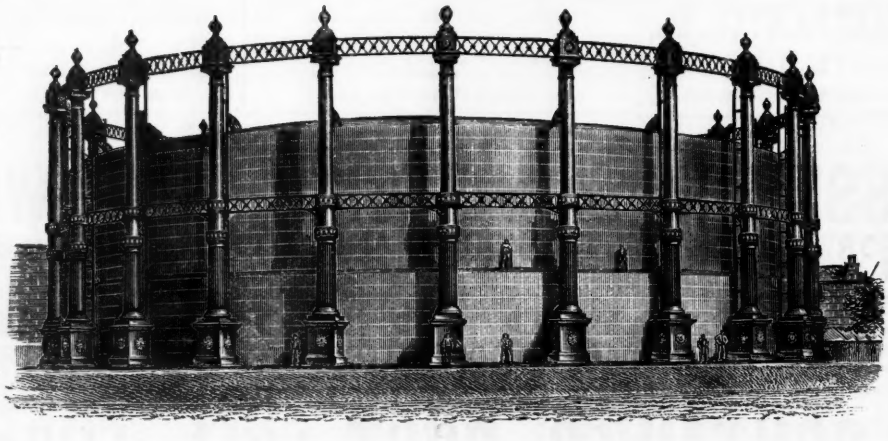

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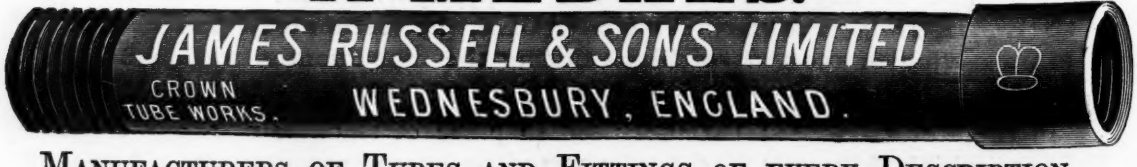

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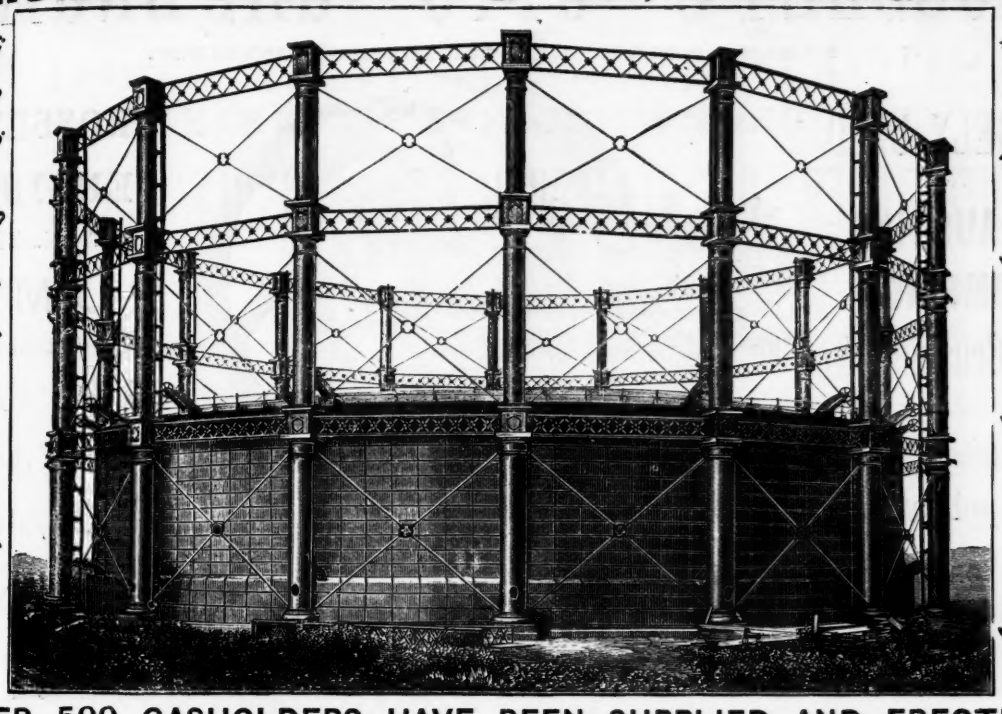

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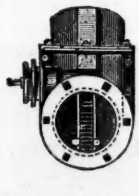

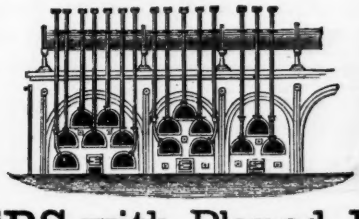

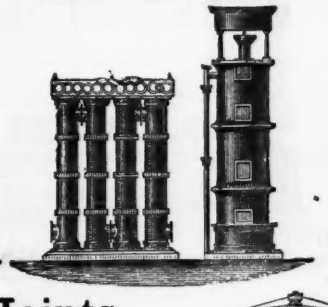

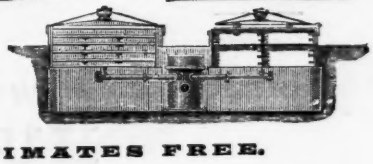

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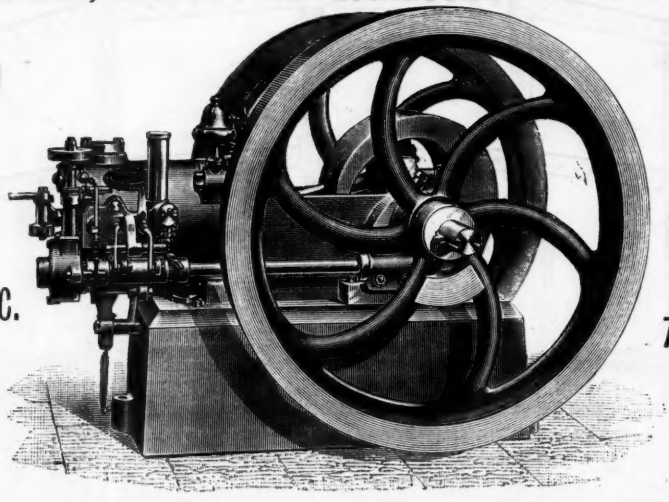

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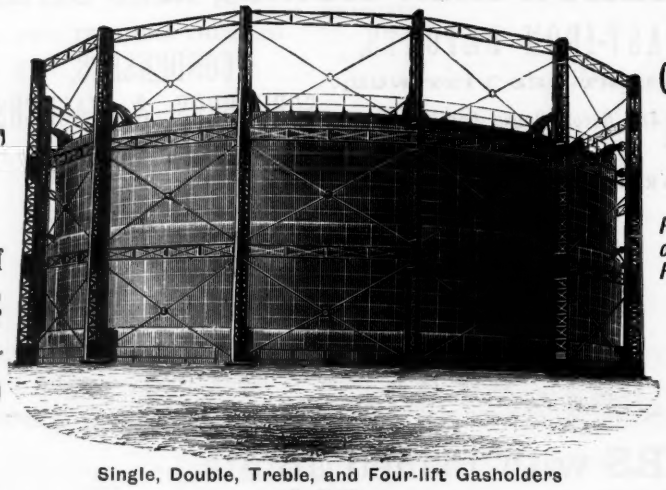

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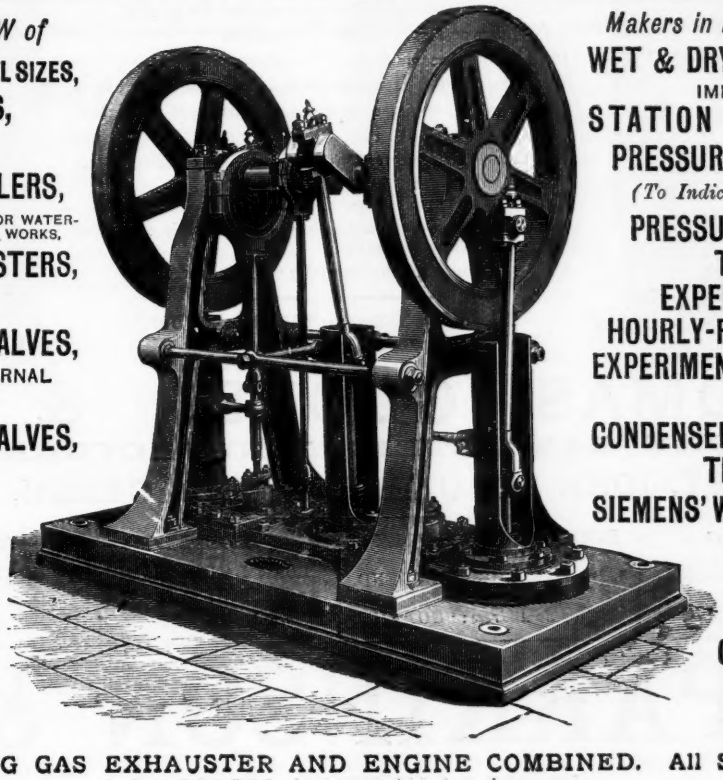

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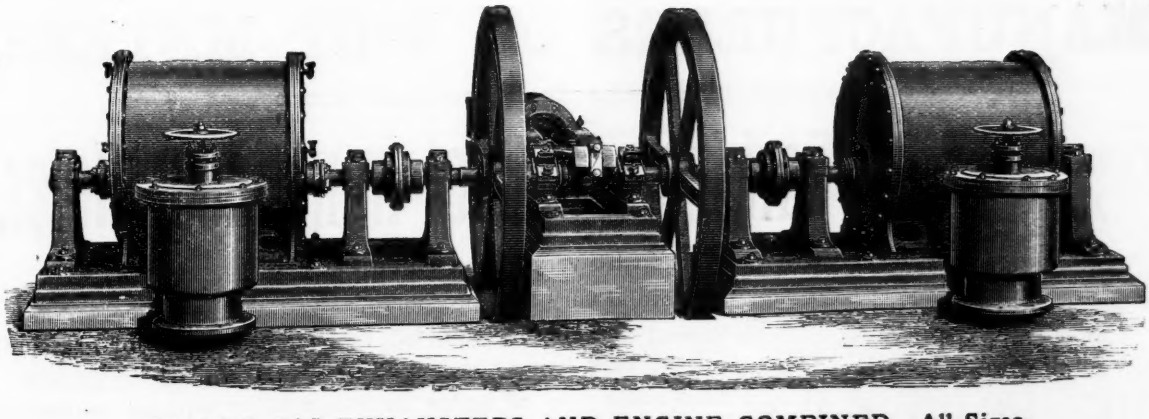

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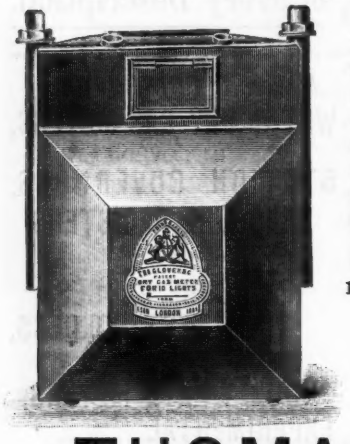

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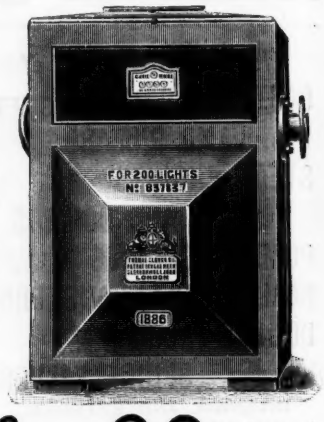

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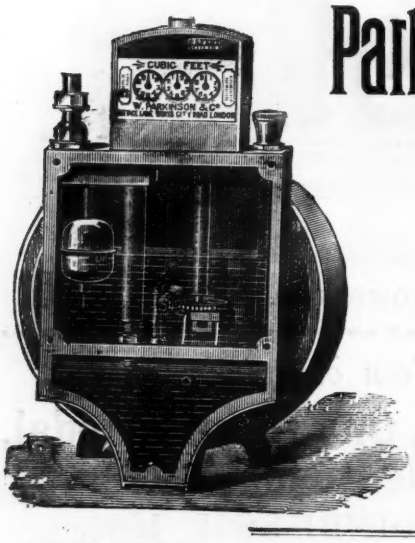

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MAY 10, 1892.

Unearned Increment—The Turn of the Market.

THERE was a very instructive debate in the House of Commons last week upon the interesting subject of "unearned increment," which most people have occasion to think about once or twice in the course of their financial dealings. It arose out of a proposal brought forward by Mr. Haldane to enable County Councils to acquire land, after having assessed its value in a sufficiently remarkable manner. It was proposed that any County Council might cause any land which they might covet to be valued under the provisions of the Lands Clauses Acts; and then, having obtained the valuation, they were to have the power of purchasing the land at the same figure at any time within the next twenty years. There was no obligation to purchase, nor was there anything to prevent the same authority from demanding a second valuation of the land at the end of the period, and so hanging up in perpetuity as much property as they might think fit to meddle with. The object of the proposal was obviously that, in cases where the land so dealt with happened to rise in value, the County Council should be enabled to step in and appropriate the increase; while they might leave severely alone any property which happened to go down in the market. It is not to be wondered at that such a one-sided proposal was summarily rejected by the common-sense of Parliament. The author of the scheme and his supporters had the "unearned increment" fairly in sight; but their reverse is tantamount to a reminder that Parliament, which in this regard undoubtedly reflects the public sentiment, is not disposed to legislate upon the principle of "heads I win, tails you lose," even when a Local Authority is to do the tossing. This experience of Mr. Haldane and his backers reminds us of the futile efforts of the defunct Metropolitan Board of Works which preceded the enactment of the sliding scale for Gas Companies. With true municipal one-sidedness, this body tried to bind the Gas Companies to lose dividend rateably with any increases in the price of gas which they might find it necessary to impose; but it never occurred to them to offer a scale of dividends and prices sliding both ways. Without this, however, Parliament would never have adopted the sliding scale as an equitable equivalent for the statutory guarantee enjoyed by the Companies.

It is not to be supposed that the modern sport of "chasing the unearned increment" will be checked by Mr. Haldane's collapse. All that will ensue from this will be the understanding that Mr. Haldane was on the wrong scent; not that the chase is utterly vain. Indeed, we should be the last to attempt to conceal from the public the strength of the current of feeling which is setting now-a-days in the direction of attempts at securing for the community some of the financial benefits of social existence which now find private receivers. The capture of the "unearned increment" is a sport in which we are all too deeply interested to ignore its vicissitudes. Difficult even to hopelessness as is the legal problem of defining this term, its meaning is plain enough to ordinary people. It is most intelligible, of course, in regard to land, and especially so when illustrated by some sufficiently glaring instance—such as that which is supplied by the financial history of the London estates of the Duke of Westminster and Lord Portman. Here we see cases of real estate which double themselves in capital value every generation, or less, without the slightest assistance from their owners, and merely because they happen to occupy a favourable situation with regard to the needs of a growing population. If any man holds land in such conditions which is worth to him one million sterling, it will be worth twice as much to his son; and meanwhile no sort of credit for this increase of value is due to him. The question is, whether he is justly entitled to put all this enhanced value into his own pocket. This is, put in a few words, the question of the "unearned increment."

The first difficulty which meets one in attempting to make up one's mind upon this subject, is that the unearned increment may be balanced by an undeserved decrement; and it is a curious question how far Society is justified in assuming a right to the one without incurring liability for the other. The second difficulty has reference to the extent to which any acceptable theory of the public right to the unearned increment should be carried. For it must be remembered that this subject is not to be dealt with as if it concerned only such properties as the Grosvenor or the Portman Estate. It would be easy enough to say (the owner and his heirs being willing) any future expansion of value of the Duke of Westminster's London property should be handed over to the County Council to be applied in any way this body might think fit. But how is the principle to be made universal, so as to avoid the creation of that dreadful iniquity "one law for the rich and another for "the poor"? Again, supposing a by no means uncommon case of a proprietor of land in the country and in a large town, what is to be done if the former decreases in value while the latter increases—a very ordinary complication? Or, we may say, that since, by making a road diversion, a Local Authority improves the value of certain premises, the owners of the latter ought to pay something

for their advantage; but supposing that by the same means traffic is withdrawn from another thoroughfare, and with the traffic the custom of the frontagers falls off, are these to be compensated? These are a few of the most obvious difficulties of dealing with the unearned increment, even when the value of land only is in question.

When the principle is conceived of as extended to other classes of property besides land, the difficulties increase enormously. Take the case of gas property, in point. Has not the value of non-statutory as well as of guaranteed gas stock risen markedly of late? Who has the best right to this increase? To this question, we may reply in Irish fashion by asking another—namely, How has the increase been brought about? Not by the consumers; for their contribution per head to the profits of the concern may be less than it was when the stock had a lower market value. We may ascribe the effect to the lower value of gold, or how we please; practically it is an unearned increment, which now goes to the people in possession. Broadly speaking, we are driven at length to the conclusion that the new-fangled term "unearned increment" means little more than the old-fashioned phrase "turn of the market," which has always been looked upon as an element in the dealer's and investor's risk. If it were, or if it could be, confiscated, would anybody be really and truly the better off? These be close questions, which we prefer throwing out to answering.

The Imperial Continental Gas Association.

The report of the half-yearly meeting of the Imperial Continental Gas Association last Tuesday will be found in another column. Although we do not, as a rule, discuss the affairs of the many Gas Companies carrying on operations abroad whose head-quarters are in London, seeing that the circumstances of these undertakings usually deprive their policy of general interest, the Imperial Continental Gas Association is such a striking institution in various respects, that it is bound to attract a good deal of notice. It is of British origin, and most of its strength is derived from its firm rooting as an English enterprise; yet it is truly international in its localized developments. Its different stations, or installations, situated in the principal European countries, share the commercial circumstances of their districts; and it is a cardinal principle with the Board to assimilate, in every possible way, their localized affairs with their surroundings. Much of the credit for this practical cosmopolitanism is due to the Chairman of the Association (Sir Julian Goldsmid, M.P.), who conducts the far-reaching and multifarious concerns of the undertaking with consummate address. The Association appears to be Dutch in Holland, German in Germany, French in France; but all the leading wires go to London, where they are held very firmly and judiciously, if one may judge by results, It is the more interesting to glance at the fortunes of this great organization just now, in view of the uproar that is being made throughout the civilized world by those who would persuade the public that the gas industry is on the wane. We know that this is not so in the United Kingdom; but what do the accounts of the Imperial Continental Gas Association show? Surely, having most sensitive feelers out in all directions, this vast undertaking must be among the first to register the commencement of any serious alteration in the influences affecting the prosperity of the gas industry. Well, it will be found, on a perusal of the Directors' report and the Chairman's speech, that the Association has, as a matter of fact, felt a variety of modifications of its business environment during the past half year. The balance of profit shows a slight falling off, instead of the usual increase; but this is distinctly traceable to very ordinary causes. Like all other Gas Companies, the Association has been troubled with strikes and rumours of strikes. Coal has been dear; and the labour agitations alarmed some of the station managers, who accordingly laid in heavy stocks of coal—bought for the purpose, unfortunately, at high prices. Excess of prudence in some respects, and perhaps a little rashness in others, landed the Association in a good deal of extra expenditure, which the Chairman unaffectedly deplores. But what then? The undertaking is organically sound, prosperous, and growing. The output of gas shows an increase for the half year of 2·36 per cent.; and the number of burners supplied has augmented by 3·88 per cent. Thus it is not possible to discover, in the record of the doings of the Association all over Europe, any indication that gas is one whit less popular or necessary than it has ever been. It is not to be expected that a gas-supplying organization, based upon the concession system, can always maintain the high profits which were obtainable under this system a generation or so ago. As the old concessions run out, the local authorities are very keen upon cutting away the margin for profit in the renewed contracts; and some of the best-paying districts are occasionally lost altogether, upon the termination of the Company's lease. In the case of the Imperial Continental, the Board have evidently recognized that their days of protection are well-nigh over, and that henceforward they will have to work under something very like open competition everywhere. They have therefore taken the prudent step of appointing Mr. Corbet Woodall to the responsible post of Consulting and Inspecting Engineer for the undertaking as a whole; and there can be no doubt that the Association will benefit greatly by his advice and supervision. It is hardly necessary to remark that the Imperial Continental Directors could not have made a more satisfactory appointment; Mr. Woodall being the one available Consulting Gas Engineer now in active work who most conspicuously unites practical skill with wide administrative experience and a *savoir faire* and kindliness which will ensure his discharge of the delicate personal responsibilities of his newly-created office, not merely without giving offence to anybody, but even so as to heighten the *esprit de corps* which honourably distinguishes the staff of the Association.

The Gasholder Patents Case.

The gasholder patents case was again before Mr. Justice Kekewich during two days last week, when only one more witness—Mr. E. Lloyd Pease, of the firm of Messrs. Ashmore, Benson, Pease, and Co., Limited, the real defendants in the action—was examined; and, Counsel having been heard for the parties, judgment was reserved. The proceedings will be found fully reported in another column. Mr. Pease's evidence did not throw much light upon the points at issue, as neither in his examination-in-chief nor in cross-examination was he taken through the merits of the competing inventions. The case has been fought throughout upon strictly legal points; and thus it remains under the consideration of the Judge. Evidence has been given, however, to show that both parties to the action have proceeded in perfect good faith. Mr. Pease is alleged to have infringed a patent of Messrs. Gadd and Mason; but there is no imputation that this was done with the object of imitation, colourable or otherwise, of a successful invention. It is purely a question of two parties having brought out what appears to be the same invention, independently of each other, and of the earlier patentee attempting to use his legal remedy against the later. Mr. Warmington, Q.C., addressed the Court for the defendants in a speech which was full of point, and conspicuous for its clearness. He divided his statement into three sections. The first referred to the alleged prior publication of an integral portion of Messrs. Gadd and Mason's patented arrangements by Mr. Terrace; the second dealt with the alleged anticipations of Messrs. Gadd and Mason by Malam and others; while the third was devoted to the question of the existence of disconformity between the plaintiffs' provisional and complete specifications. Next day the Attorney-General replied on the whole case for the plaintiffs; traversing Mr. Warmington's arguments in order, and speaking with his wonted power and persuasiveness. He had to show that Mr. Terrace's remarkable communicativeness did not in law result in the publication of his invention; to throw discredit upon the alleged "paper anticipations" of Standfield and others; to establish a fundamental difference between Malam's devices and those of the plaintiffs; and to demolish the plea of disconformity between the plaintiffs' specifications. How he did this, may be gathered from our report. Pending the delivery of judgment, we must content ourselves with recognizing the ability of the professional gentlemen engaged in the case, which has been a good lesson in the law of patents, if not upon the technicalities of gasholder construction and guiding.

Labour Sunday and Its Consequences.

One of the best of the many novels written by the late Lord Lytton has for its title the provoking question "What will he do with it?"—which is an inquiry that, once suggested, clings to the mind until it forms a habit of thought. How many things there are which men strive after with all the desire evoked by the apparently

unattainable, only to find in the event of success that they do not know what to make of their victory! Last Sunday week, for example, was May Day; and almost ever since that day twelvemonths, all the professional Labour agitators in London had been—we were on the point of saying working, but the term would obviously be inapplicable to individuals who so successfully cultivate the idleness, if they fail of the beauty, of the "lilies of the field"—scheming to make the occasion memorable by securing the biggest mass-meeting vote on record in support of the Legal Eight-Hour Day. It is not so many months ago that the expenses of the meeting of 1891 were liquidated; for the "masses," although they willingly "enthuse" to order, do not so willingly pay for the luxury. However, what with the help of all sorts of popular organizations, this year's May Day meeting in Hyde Park was made into a very big thing indeed, so far as numbers go. On this particular Sunday, London presented the truly wonderful spectacle of a capital given over to the largest organized mob ever collected for the purpose of effecting a political demonstration—a mob which far outnumbered the destroyers of the Bastille, or any other popular assemblage credited in history with having changed the face of a nation by brute force—and not a window was broken, nor a single assault committed in the name of the People. Without digressing by a hair's-breadth from their duty, the police force present on the occasion attended the crowd rather than controlled it; not a soldier of the meagre garrison of London was confined to barracks; not a gun was moved in the defence of law and order. The whole of the supposititious army of the unemployed of London—that seething mass of outlaws which sensational journalists have described as awaiting an opportunity for breaking in upon the superficial civilization of the English capital, and exposing its hollowness and weakness—was invited to rendezvous on the Thames Embankment; and what was the result? Alas! the very success of the organizers of the great meeting proves how little justification there is for their perfervid demands for legislative interference with the conditions of adult labour. They got together a well-behaved and decidedly cheerful crowd of teetotallers, social democrats, trades unionists, and so forth; and after some frothy oratory, which was not too rigidly confined to the subject under consideration, they carried a resolution in favour of the Eight-Hour Day. Then the mob went home, having given most of the publicans on the lines of route a happy, if a busy, day—lasting, moreover, considerably longer than the magic octave.

But the organizers of the demonstration were left with the responsibility of their resolution; and the question speedily arose, What was to be done with it? They offered it to the leaders of the Houses of Lords and Commons, and to the head of Her Majesty's Opposition; and, to their amazement and grief, these noble and honourable gentlemen agreed for the nonce in begging to be excused from having anything to do with it. They next hunted out the Metropolitan Members of Parliament, to whom individually and collectively they proffered the support of the constituents of the Hyde Park meeting in return for their adherence to the Hyde Park programme. But they got nothing by it; they only fell into the snare set for them by that artful "gentleman "of the long robe," Sir Charles Russell, who suggested that they should put their demands in writing—well knowing that there is hopeless disagreement among the Labour agitators as to the necessity or desirability of limiting working time by legislation. And so the great meeting has failed to impress anybody. Of course, the demagogues are furious. They expected to be fawned upon by politicians of every shade, and to receive various gratifying acknowledgments of their asserted power to sway the mass of the working population of the Metropolis. And behold! everybody gives them the "cold shoulder" instead. Perhaps the disappointment will teach them a useful lesson. The truth of the matter is that the same remark which is made about the supposed demand for Woman Suffrage is equally applicable to the cry for the Legal Eight-Hour Day. If those who are so loudly declared to be in want of it were so in fact, and had one mind on the subject, they would get their desire forthwith. There is not the remotest likelihood of the triumph of the Eight-Hour Day agitators; while of the workers who have taken the trouble to express an opinion on the matter, a good half reject it with contumely.

WATER AND SANITARY AFFAIRS.

The Royal Commission on the Water Supply of the Metropolis proceeds at a steady pace. Documentary evidence precedes the oral, and proves so extensive that the latter is unavoidably delayed. The Metropolitan Water Companies have sent in their statements, as also the Corporation and the London County Council. In addition, communications have been invited from all the County Councils, Town Councils, and Local Boards in the basins of the Thames and the Lea. These outlying authorities, so far as we can learn, take the course which might be expected of them, and are unanimous in declaring that their districts have no water to spare. We suppose if the Welsh authorities were asked they would say the same thing. All the several statements have to be examined by every member of the Commission—necessitating printed copies in every instance. The Metropolitan Water Companies duly met this requirement; but the County Council—perhaps out of regard to the ratepayer—sent their statement in manuscript. We apprehend that the Local Authorities generally have taken the same course. The Commissioners meet again to-day; but it is not expected that witnesses will be examined until Monday next—the following day being devoted to the same purpose, and possibly the Wednesday. It will be seen by our report of a speech by the Chairman of the West Middlesex Company, that it is thought the Commissioners rather want the Companies to show they could supply the coming wants for the next forty years. This is certainly, as Sir W. H. Wyatt remarked, "a stiff order." But that such a requirement is entertained by the Commissioners is, we believe, little more than a conjecture on the part of the Companies, though the latter have seen fit to provide against the chance of such a condition being laid down. So far as relates to the physical facts, we may take it as perfectly certain that the population of London and its environs will not increase at the same rate during the next forty years as in the forty just past. We mentioned last week that the New River Company reckon on maintaining the supply for more than half a century, if the population merely advances at the same rate as during the last two years. If the higher rate of preceding years is maintained, the supply will be adequate for forty years; but the full reckoning, based on the lower rate of increase, goes as far as sixty years. It will be very important to have this clearly shown before the Commission; for if the supply is thus abundant in the valley of the Lea, there ought to be no difficulty in respect to the Thames. The New River Company rely much on their wells. The Thames Companies, we understand, are prepared to carry out a system of compensation reservoirs, so as either to swell the volume of the river when the stream is running low, or to feed the supply when it is undesirable to draw from the river. The idea that the ground will not permit such reservoirs to be constructed appears a very odd one, seeing how many reservoirs already exist in the neighbourhood of London. We apprehend that a far more difficult problem is that of conveying water from Mid-Wales to the Metropolis, with all the risks of a severe winter as affecting an open conduit, and dynamiters in relation to a pipe. But distant sources of supply will form no part of the investigation which is now commencing. The resources of the Thames and Lea Valleys form the actual subject of inquiry; and there are some indications that the position of the New River and East London Companies will be taken in hand first, before the Commissioners proceed to deal with the case of the Thames Valley.

The speech made by the Chairman at the half-yearly meeting of the West Middlesex Water Company last Tuesday, although brief, touched on several points of interest. We have already alluded to some extent on the part which dealt with the inquiry just being opened by the Royal Commission. Concerning this matter, we may further remark that the Chairman was doubtless justified in saying that the Directors of the Metropolitan Water Companies had "an anxious time" before them; while he was equally warranted in arguing that the Royal Commission was preferable to a Committee in the House of Commons. We may add that the consumers in the West Middlesex district have great reason to prefer the Water Company to the County Council. Should the latter obtain possession of the water supply, there would be an immediate end to the 7½ per cent. rebate now enjoyed by the Company's customers. A consideration of this kind

should also have weight with those who pay for water in other parts of London. If the Companies are left alone, it is probable that one after another will, in course of time, be able to give a discount on their rates; whereas whenever the supply becomes municipalized the result to be expected is not that of a liberal discount, but a charge on the ratepayer as well as the consumer. But the gift of £17,000 per annum from the West Middlesex Company to the consumers in their district, is a matter concerning which the Daily Press has little or nothing to say, reserving its energies for a diatribe when one of the Companies takes the necessary steps for enforcing payment from some contumacious consumer. Whether the Press will be any better satisfied with the County Council, should the latter take the place of the Companies, is at least doubtful. That a change is to come, is an event which Sir W. H. Wyatt contemplates; but he cannot believe that the proprietors of the existing undertakings will be deprived of that which is their due. That an effort will be made to perpetrate such damage may be anticipated; and the prospect has doubtless produced the recent "panic" in the Share Market to which the Chairman made reference. But the attempt is destined to fail, unless the British Parliament is to be overshadowed by the County Council.

Mr. H. G. Wilson, of the Southwark and Vauxhall Water Works Company, was elected an associate member of the Institution Civil Engineers at the monthly ballot last Tuesday.

A New Electrical Term.—A new feature will be introduced in the Provisional Orders granted to electric lighting undertakers by the Board of Trade in the present session. According to the *Electrician*, the Board have approved of the word "kelvin" as the definition of an electrical unit; and, Lord Kelvin (better known to many people as Sir William Thomson) having acquiesced, the words "hereinafter called a kelvin" will be inserted after the word "unit" throughout the Orders.

Association of Municipal and County Engineers.—The members of this Association, of which Mr. T. Cole, Assoc.M.Inst.C.E., Secretary of the Incorporated Institution of Gas Engineers, is Secretary, had a very successful meeting at Nottingham on the 29th and 30th ult., under the presidency of Mr. T. de Courcy Meade, of Hornsey. Mr. Arthur Brown, M.Inst.C.E., Borough Engineer of Nottingham, read a paper on "Municipal Works in Nottingham;" and Mr. W. Spinks, Assoc.M.Inst.C.E., one on the "Public Health Acts Amendment." The members visited the subways in course of construction in the town; and also the Corporation sewage farm. After the first day's business, they dined together.

A Plea for the Methven Standard of Light.—A correspondent whose position precludes his communication from appearing in our "Correspondence" columns, writes to plead for the retention of the Methven standard of light—not to the prejudice of any other, but in recognition in the future, under proper regulation, and standardizing if necessary, of its worth as a convenient and ready measure of the illuminating power of coal gas. He points out that it has long been an accepted fact that a 3-inch flame in a "London" Argand burner gives a light of 16 candles, and that this was made the basis of the construction of Mr. Sugg's illuminating power meter some twenty years ago. The difficulty of exactly estimating the height of the flame appeared to be the principal objection to the use of that instrument; and the introduction of the Methven standard removed the difficulty, by allowing only the light from the central portion of the flame to pass through a screen provided with a slot of fixed dimensions—the light being, it was asserted, a constant one, equivalent to two candles. Our correspondent remarks, however, that what is being dealt with in the Methven standard is a beam or pencil of light, which cannot, by its very nature, follow the law of inverse squares as in the case of light radiating from a centre. So that it is not surprising to find that the Methven screen, when used in the ordinary way, can only be relied upon within certain limits of illuminating power. But this difficulty may, he says, be largely overcome by fixing the disc at a definite distance from the screen (preferably at the point corresponding to 16 candles in a 60-inch photometer), and noting the consumption of gas required to maintain a 16-candle flame at the other end of the bar, and making the necessary correction. This will make the standard much more constant, as there will be a fixed illumination of the disc at that particular distance, of the same colour as the light to be examined—an important point; and the gas to be tested will be consumed at all times under more regular conditions than by adjusting to 5 cubic feet per hour. Used in this way, and free from all carburetting complications, the Methven standard will, he considers, bear comparison with any of its rivals, on the score of constancy, readiness to hand, rapidity of working, cheapness, and convenience to the operator. The absolute value of the standard, used in the manner suggested, might, our correspondent thinks, be a matter for the Standards of Light Committee to determine.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 865.)

THE condition of affairs in the Stock Exchange in the past week was fairly satisfactory, for signs of recovery, howbeit slow and gradual, are beginning to manifest themselves. The favourable tendency was apparent on Tuesday, when the Exchange opened after its usual holiday on the first working day in May, and found that the May Day demonstrations had not disturbed the peace of Europe. Then the abundance of money practically compelled buying; and although this was at first, and has for some time past been, confined to first-class securities, yet the supply would not hold out for ever. The result was that second-class stocks had to be taken; and by the continuation of the process, and applying it to the issues less sought after, the normal condition of business will gradually be restored. As for the Money Market, it is scarcely an exaggeration to say that there is no market for money, so difficult is it to find employment for it. The Gas Market has been active, owing to the dealing in Gaslight "A;" but with the exception of this stock, transactions generally have been limited. The set against Gaslight "A" was continued on the opening day; and it looked very much as if it was going to touch the level 200. But 202 was the lowest reached; and it oscillated between that figure and 205—the quotation closing with a fall of 1 only. It recovered the lost point, however, the next day, and continued to amend slowly; regaining two more points, and business being done more than once at 207. Meanwhile the demand for secured investment stocks had put up the 10 per cent. preference; and the debenture issues changed hands at good prices, but without any advance in the quotations. A great deal more business was done in South Metropolitans; the "A" being in good demand, and rising 5. But "B" was depressed by a special bargain at 220; and the quotation was lowered 3. Nothing at all was done in Commercials; but the new stock was put down 2½, in sympathy, perhaps, with the recent retrogression in the old. Suburbans and Provincials have scarcely been touched; and the only move is a rise of 1 in Alliance and Dublin. Continentals are quiet and steady; Imperial sticking fast at 225-226. Among the rest, the only features to note are an advance of 1 in Buenos Ayres debenture, and a fall of 2 in Chicago second mortgage bonds. Business has been very quiet in the Water Companies; but the recovery in prices proceeds, and most of them have risen moderately.

The daily operations were: Sharp business in Gaslight "A" marked the opening on Tuesday, and the quotation fell 1; but South Metropolitan "A" rose 5. Lambeth and West Middlesex Water rose 1 each. On Wednesday, Gaslight "A" recovered 1, after some brisk dealing. Chicago second bonds fell 2. On Thursday, prices throughout the list were well maintained; but nothing varied. Friday brought the decisive turning-point in Gaslights. The "A" rose 2; "C," "D," and "E," 2; and "J," 1. Alliance and Dublin also improved 1; but Commercial new fell 1. In Water, Chelsea and Kent advanced 2 each; and Lambeth and West Middlesex, 1 each. Prices were for the most part good on Saturday; and Buenos Ayres debenture rose 1. But South Metropolitan "B" receded 3. In Water, Southwark "D" rose 3; and Lambeth 7½ per cents, 1.

ELECTRIC LIGHTING MEMORANDA.

The Effect of Strange Company upon Gas and Water Fittings—The Affairs of the Metropolitan Electric Supply Company—The Trouble at Taunton—Mr. Shoolbred on the Bradford Experiment.

WE have received from the Secretary and General Manager of The Gaslight and Coke Company copies of correspondence between the Board of Trade and the Company, and of two reports—by Major Cardew, R.E., and Mr. G. F. L. Foulger respectively—relating to the destruction of gas-meters in Pall Mall and Piccadilly, by electricity supplied by the St. James's and Pall Mall Electric Light Company. The substance of these communications will be found elsewhere; and our abstract should be carefully noted by anyone who may still be inclined to credit all that electricians say about the harmlessness of lighting currents, even of the low voltage variety. It appears from Major Cardew's statement that electric lighting currents are capable of playing strange tricks, not merely with gas-pipes but also with water-fittings. It is unnecessary to go through Major Cardew's remarks in detail, which show that the laying of electric lighting mains does, as a matter of fact, introduce an element of danger of a novel and, what is worse, a mysterious kind into districts where gas and water mains and services exist. It is no defence to this impeachment to say that, where the electrical work is perfectly done, the danger disappears. We have to live in a world in which perfection is not to be found either in regard to electrical or any other class of work; and therefore Major Cardew is fully justified in remarking of the Piccadilly "accidents" that "the steps to be taken by the Board of Trade

to provide against the recurrence of similar faults and their consequences will require very mature consideration."

We referred last week to the affairs of the Metropolitan Electric Supply Company, and commented upon the circumstance that in this concern, as in so many other central station electric lighting undertakings, the capital expenditure appears to run a race with the revenue. We have since received copies of the report and accounts issued by the Directors up to date. This year's statement shows that the Company have the equivalent of 96,000 lamps of 8-candle power connected for service. The most interesting information relating to the position of the Company is, however, to be extracted from the accounts; for, like many Directors' reports, that issued for the comfort of the Metropolitan shareholders is more instructive by its omissions than by its disclosures. The accounts are made up in the statutory form, according to which the revenue is distinguished from the capital entries; but it is within the discretion of the Board how the line is to be drawn. It has been reported that the revenue account of the Company for the past year shows a profit balance of £9719; but when the account is examined, it appears that this result is secured by the simple expedient of only charging to revenue a "proportion" of the running expenses. Thus the important items of salaries, rents, rates, and taxes, Directors' fees, and "other expenses"—this last being an exceedingly elastic term—are divided arbitrarily between revenue and capital; the proportion ascribed to the latter for the year being no less than £33,894, which, if duly put against revenue, would have changed the nominal profit of £9719 into the very substantial deficit of £24,175. Last year, also, a so-called interim dividend amounting to £4708 was paid, which must have come out of capital, just as this year's dividends will do. No wonder the Company have spent all their money and now want to raise more on debentures, in order to finish work in hand. It is all very well to argue, as the Directors probably do, that, while a big undertaking like this is in course of development, some of the administrative expenses should be borne out of capital; but the process had better be confessed in their report than left to be discovered by dissection of the accounts. The resort to this expedient, in the desperate attempt to show a profit balance, is too significant to be overlooked.

Taunton, as our readers are already aware, is in trouble about its electric lighting. The local company are in trouble, and the Directors have the full agreement of the proprietors in declining to continue throwing good money after bad; and so they will very soon stop the works if the one alternative fails of selling the whole thing to the Corporation as a going concern. The Corporation are literally at their wit's end to know how to act. A Committee of the Town Council and the Borough Surveyor have reported against the purchase; but the Mayor and some of the local magnates seem to be most anxious to help the Company—out of the rates, of course; and so they procured a remit of the question of purchase to a professional expert to be recommended by the Board of Trade. The choice fell upon Mr. Gisbert Kapp, of whose competence there can be no question. Mr. Kapp has now reported most fully and fairly, but dead against the proposed purchase. What was to be done? The expert having refused to play the part of blessing the purchase scheme, some of the local people pretend to have discovered in him the existence of a bias against the system submitted to his inspection; and they have succeeded in getting the Town Council to postpone for awhile taking action upon his report. It does not seem to have occurred to these ingenious partisans that it does not need much "bias" on the part of an expert to advise against the expenditure of public money in purchasing a loss. If there are people in the Taunton Town Council so enamoured of the local electric lighting experiment that they decline to hear anything against it, why do they not form a new company to take over the concern and work it for all it is worth? There will be no difficulty in obtaining an expert to approve such a resolution; but, happily, Mr. Kapp has rendered it impossible for the higher powers to sanction the raising of any money upon the security of the Taunton rates for any such purpose.

Mr. J. N. Shoolbred, the Consulting Engineer for the Bradford electric lighting scheme (which, it should be remembered, was decided upon in 1888), read a paper last Wednesday before the Society of Arts, describing the installation, and expatiating upon its results. He maintains that the low-pressure, continuous current system recommended by him, and adopted for this experiment, has proved itself to be the best that could have been tried for the purpose, inasmuch as it lends itself to more applications suited to the needs of a manufacturing and commercial centre than any alternative system. In view of the clamorous appeals for recognition of "improved" systems that are now being raised by rival electricians, Mr. Shoolbred has a fair right to defend himself in this way. He makes out that the Bradford experiment has been completely successful; and so perhaps it has been, from the point of view of the consulting electrician. When Mr. Shoolbred himself, however, so far quits the mere technician's standpoint as to ascribe much of the success of the enterprise to the business qualities of Alderman Priestman, the Chairman of the Gas and Electricity Committee, and Mr. W. T. M'Gowen, the Town Clerk, we are inclined, without cavilling at this award, to suggest that the principal reason why the Bradford electrical experiment has done even so well as it has, must be looked for in the fact that it has been supported on the broad back of the Corporation gas undertaking. There is not the slightest reason to doubt that electric lighting in England would flourish exceedingly if it could always be similarly circumstanced.

GAS CONSUMED IN WORKS AND OFFICES.

A good deal is written and said from time to time upon the subject of the responsibility of suppliers of gas for assisting their customers to make the best use of it for the different purposes for which it is consumed. It is undeniable that a very great advance in the recognition of such a responsibility has been made in recent times. The old opinion that the gas company or the gas department of a corporation, as the case might be, have nothing to do with the manner in which the consumer uses the gas supplied to his premises—that the technical interest of the manufacturers and distributors of gas ends with the meter—has been very greatly modified, if it has not been wholly discarded, by the more progressive order of modern gas-works administrators. It is true that the most hide-bound of gas managers, in the days when it was held to be the best policy for a gas company to keep itself as much as possible out of sight of the public, was continually being compelled to recognize the fact that his responsibility extended in popular estimation beyond the meter, and even further than the burner, by having his attention repeatedly called to complaints of bad gas, dirty ceilings, poor light, and so forth. It is a fair generalization on the attitude of the old-fashioned gas company to say that, as a rule, they never interested themselves with what the consumer did with his gas until he began to complain; and even then, if the inspector sent to investigate the cause of complaint could report that it did not arise "on the company's side" of the meter, the thing was forthwith dismissed.

However heartily many of us may admire the "good old times," few that have any liberal views about gas-works administration will deny that it was a notable improvement when gas managers began to emerge from their shells, and to demonstrate to their customers and fellow-citizens that they felt an interest in the proper application of gas which did not need to be stirred up by complaints. The local exhibitions of gas apparatus, the displays of first-class fittings at the gas offices, the emergence of the gas company among the best business firms of the town instead of lurking down by the canal or the railway goods' yard, the appearance of the gas manager upon the lecture platform—these and other signs of awakening enterprise on the part of gas manufacturers are worthy of being classified among the evidences that go to prove that the modern time is better than the old. Where is the old-fashioned gas agitator? Where the once ubiquitous gas-burner peddler? If not extinct, they lurk in the darkest and most neglected holes and corners of the most benighted towns. It has taken the modern race of gas-works administrators some time, and cost them no little effort, to dispel the bad old superstition that gas companies foster the worst and most wasteful descriptions of consumers' apparatus, from the notion that the more gas that is burnt, anyhow, the better it will be for the sellers. There are cities and towns of the United Kingdom where it is now commonly understood that the gas company prefer ten willing and and satisfied customers to one grudging and constrained consumer. Of course, it may be remarked that this changed aspect of the gas companies is not due to simple virtue on their part; but that self-interest has a good deal to do with it, and that even a gas company can be complaisant when it is discovered that the commercial and private classes of gas consumers in any locality are not so restricted to this one means of lighting as was formerly the case. There is something in this argument, and we do not claim for the modern gas-works administrator who does his best to be agreeable and helpful to the community, credit for anything more than obedience to the promptings of an enlightened self-interest. He looks for his *quid pro quo*, of course; and he gets it. But the fact remains that, in helping himself, the enterprising gas-works administrator does a great deal of good to his fellow citizens individually; and this ought to be acknowledged, even if there is no need to give the shrewd man of business the thanks due to a more disinterested benefactor of the public. We may also, moreover, comfort ourselves with one reflection bearing upon this point—that the man who does something for his fellows, for sound commercial reasons of his own, is less liable to make mistakes than the professed philanthropist, whose benefactions are always in danger of doing more harm than good. If in showing a tradesman how to render his shop front brilliant by the proper use of a good gas-burner, the gas engineer arouses the emulation of neighbouring traders, whereof he reaps the benefit in the long run, this does not detract from the merit of the service done to the individual shopkeeper.

A great deal more might be accomplished in this way than most gas companies yet think necessary; and not less so for the positive reason that shopkeepers and people in business are, to all intents and purposes, and notwithstanding anything that can be advanced to the contrary on behalf of electricity and cheap mineral oil, as much compelled to burn gas as ever. With the cheapest electric light working out to something between 6s. 6d.

and 8s. per 1000 cubic feet for 16-candle gas, it must be a very long time before the average shopkeeper can afford to make much use of the incandescent electric lamp; and even when he does, for the sake of advertisement, his next door neighbour can always beat him in brilliancy of illumination by simply increasing the number or power of his gas-burners, and yet keep his lighting bill low in comparison. And no tradesman who respects himself and desires to pose as a solvent individual can afford to light his place of business with oil, unless he deals in it or in lamps; and then the general effect is seldom good. So that the business man must have gas; and we desire to impress upon all whom it may concern, the eminent desirability, in the interest of the gas industry, that he should be encouraged in every possible and legitimate way to lose sight of the compulsion to burn gas, in the advantages of the practice compared with any available alternative.

With this view, we argue that it is the plain duty of the gas manager to so keep himself abreast of the progress of the trade in all kinds of gas-consuming appliances, as to be able to express an independent, reliable opinion respecting their merits and demerits. It is not for the gas manager to force developments of this or that type of application, albeit he has a perfect right to draw atttention to neglected points. Like many another man in a conspicuous office, the gas manager can effect most good by judiciously following as well as leading public opinion. No useful service is ever done by finding fault with the public taste, unless a better way is at the same time disclosed and followed. The public may be the victims of artful advertisement, and may betray a tendency to patronize the "cheap and nasty" instead of the good and reliable. It requires judicious treatment to wean people from this weakness; but most can be done by example.

This chain of thought leads up to a very clear and definite issue. Gas companies have indeed done very much of late years to familiarize the public with good appliances for the use of ordinary consumers; but can it be said that, in the majority of gas-works, the owners of factories of a similar character will find instruction in the art of effective and economical lighting? We fear not. In the half-yearly accounts of the London gas companies, and of some other undertakings, there appears regularly a considerable entry for "Gas consumed on the works"—this amounting to about 1 per cent. of the gross production. So habituated are technical critics to this entry, that few probably stop, in their scrutiny of more salient matters, to ask themselves whether this is a necessary and reasonable condition of gas manufacture. It means that gas-works are among their own largest consumers; and we are certain of not being contradicted when we say that this is a state of things which rarely strikes the gas manager with due force. In many works, the number of flaring lights needed to enable the workmen to see their way about and do their ordinary duty, is enormously disproportionate to the real needs of the case. Day and night these lights flame away—most of them miserable examples of how not to burn gas—and nobody stops to remark that the annual cost of thus lighting up dingy, dark, and noisome sheds and shanties would go a long way to pay interest on the capital cost of new, light, and airy structures. In all old gas-works, and in many new ones, too much gas is wasted. The old saying about the blacksmith's horse and the shoemaker's wife naturally occurs to mind with reference to this state of affairs; but there is no excuse, although there may be much truth in a proverb.

This is a matter that gas managers generally should see to, for their own credit's sake. And it is a question not only of waste of gas in the works, but also in main-laying. Nine companies' workmen out of ten do not seem to entertain the smallest idea that gas, which is "raised out of the same," is something to be treated with respect. Partly on this account—the neglect of good gas-lamps in gas-works—it has now come about that well-designed and economical factory lights are so rarely seen. We do not forget or overlook the fact that particular patterns of high-power street gas-lanterns are to an extent adopted for factories; but it must be obvious there are many situations in works of all kinds, and especially in gas-works, where a street lamp would be unsuitable. Are these cases sufficiently looked after? The answer must, we fear, be in the negative.

Now, unless gas managers make a proper use of gas themselves, and treat it intelligently for their own purposes, they can hardly expect that the heads of other factories will do so. Waste, as a matter of fact, does go on in many a factory, mill, and yard; until one fine day the amount of the bill strikes the consumer as exorbitant, and he forthwith looks up other methods of lighting his premises, and makes his comparisons of cost not with gas at his best, but between gas at its worst and something else at an ideal efficiency. Wherefore we counsel gas managers generally to pay attention, where this has not already been done, to this illusive entry for "gas consumed on the works," which there is only too good reason to suspect of often covering a perfectly scandalous neglect of the first principles of effective gas consumption in the the very places where, of all others, these should be most systematically practised and exemplified. The matter is worth looking into, not only for the sake of the immediate economy to be realized in many instances; but even more for the sake of the consistent example which a well-lit gas factory shows to proprietors of coal-yards, iron-works, and similar establishments.

NOTES.

American Shell Lime.

The industry of shell-lime burning forms the subject of an illustrated description in a recent number of the *Scientific American*, although there is nothing particularly scientific about the processes involved. The manufacture, however, is a peculiarly American one, inasmuch as it has been created as a consequence of the enormous consumption of oysters and clams in the City of New York, which again is due to the remarkable richness in shell fish of the waters in this neighbourhood. The collection and dealing with the empty shells gives employment to many hundreds of people; and the lime produced by burning them commands a ready sale, especially to the gas companies, who find it the best and purest they can obtain for use in purification. The shell-kilns do not differ from any other lime-kilns of the simple continuous kind, and are fired with coke; the idea of regenerative gas-kilns not having penetrated to the neighbourhood of New York. The quick shell lime sells for 8c. per bushel on the spot; and the daily output of the seven firms in the trade in New York and Brooklyn is from 12,000 to 14,000 bushels—the greater part of the raw material coming direct from the fish markets.

The Efflorescence on Brickwork.

Mr. H. C. Standage writes to the *Builder* upon the subject of the efflorescence on brickwork, which so often disfigures newly-built walls with white, semi-crystalline powdery patches, and which is so troublesome to architects and builders. He accounts for the formation of the patches as follows: Suppose the soft, porous brick to have imbibed water from a passing shower of rain, whereby some of the sodium salts are dissolved. As the surface of the brick dries, this salt of soda will become dry and be converted into the anhydrous sodic oxide, which is the white efflorescence complained of. So long as any soluble salts of soda remain in the mortar, to be dissolved out by the water imbibed by the porous brick, so long the formation of the efflorescence continues, until every particle of the soluble salt has been dissolved out and brought to the surface. The nearest approach to a successful remedy discovered by Mr. S. Standage in the various proposals for dealing with the mischief that have come under his notice is hydrochloric acid. If the bricks could be saturated with this acid, the trouble would not arise; but such a remedy is obviously impracticable. Acting on the hint conveyed by the fact that excess of sodic hydrate in soap-making is expelled from the soap by salting it—*i.e.*, strewing the surface of the soap with common salt as it floats on the ley—Mr. Standage applied a solution of salt to the white efflorescence on some bricks that were badly stained with it. In every instance where the solution was applied, the white efflorescence was instantly removed, and what is more, has never reappeared. In obstinate cases, three applications—or well saturating the bricks even once—have sufficed to effect the desired result. Seeing, therefore, that the remedy seems to be a choice between hydrochloric acid and common salt, Mr. Standage recommends the latter. The bricks may either be dipped in the solution before being laid, or the wall well washed afterwards, until the bricks are thoroughly impregnated. It is not stated whether or not Mr. Standage has considered the effect of salt in keeping a wall damp during humid weather.

Compounds of Acetylene and Metals.

A somewhat remarkable chemical compound, the preparation of which seems to throw some light upon the vexed problem of the origin of petroleum, has been described in the *Comptes Rendus* by M. Maquenne. It may be regarded as an acetylide of barium—that is, a compound formed by the substitution of the hydrogen of acetylene by metallic barium. Its chief peculiarity is that of evolving pure acetylene gas with great rapidity when brought into contact with water. M. Maquenne has obtained the new substance by the direct action of metallic barium, in the form of an amalgam consisting of one part of barium to four parts of mercury upon powdered retort carbon. On distilling such a mixture in a current of hydrogen, when the mercury had been expelled and the mass brought to redness, an energetic reaction was found to occur between the barium and the carbon, with production of the new carbide or acetylide. The hydrogen takes no part in the reaction, and may even be replaced by nitrogen. The new substance, as formed in an atmosphere of hydrogen, consists of a grey, friable mass, which remains unaltered when heated to bright redness. The moment it is thrown into water, however, it is decomposed, with rapid effervescence and the evolution of acetylene, which is remarkably pure. This is a new method of synthesizing acetylene, which M. Maquenne considers interesting with regard to the formation of the natural hydrocarbons. He thinks it probable that other metals possess the same property of forming acetylides under the influence of high temperatures. If, therefore, as M. Berthelot has attempted to show, it is a fact that acetylene forms the primary material, or starting-point, for the formation of other hydrocarbons, it is quite possible that compounds of some metals with carbon, upon coming into contact with water under conditions of more or less pressure, may have given rise to the immense stores of natural hydrocarbons which exist in different parts of the world.

TECHNICAL RECORD.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

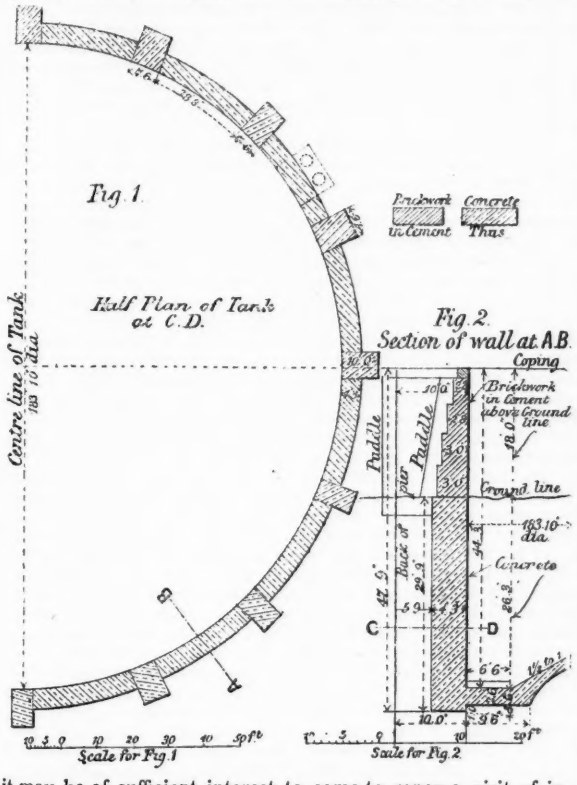
The Half-Yearly Meeting in Newcastle-on-Tyne.

In the JOURNAL last week we published a general account of the proceedings at the meeting of the above Association on the 30th ult., and also the paper read by Mr. W. J. Warner, on the subject of the action of the sliding scale (*ante*, p. 799). We now complete our report by giving the two papers read by Mr. V. Wyatt, briefly summarized last week, and the discussion on the three.

Mr. WYATT's first paper was as follows:—

NOTES ON TANK CONSTRUCTION.

I read a paper to this Association in April, 1889, on "A New Departure in Tank Building."* I proposed, in forming the wall of a tank, to dispense with the all-round continuous timbered trench, and substitute for it a sectional construction for the portion of wall below the original ground level. The tank is a horizontal arch, composed of monolithic blocks, or *voussoirs*, side by side resisting the pressure of earth behind the wall. This principle has been carried out in the last gasholder-tank (No. 5) recently completed at the Redheugh Gas-Works; and



it may be of sufficient interest to some to repay a visit of inspection. The diameter of the tank is 184 feet, and its depth 44 ft. 3 in. clear, inside the walls, to receive a gasholder of three million cubic feet, in three lifts. The wall from the foundation up to a height of 29 ft. 9 in. (the original ground level) is of concrete, and constructed of 32 blocks, or sections built *in situ*. There are 16 sections, each 29 ft. 9 in. by 10 ft. by 7 ft. 6 in., for the piers under the wrought-iron standards; and 16 panels between, each 29 ft. 9 in. by 28 ft. 8 in. by 4ft. 3 in. In one of the panels is introduced the pier of concrete, 29 ft. 9 in. by 10 ft. 6 in. by 10 ft., for enclosing inlet and outlet pipes. The monoliths radiate from the centre of the tank, and close in upon each other to form the horizontal arch, which is immovable, except by absolutely crushing the material.

The sections are built alternately in the first place, so as to allow about a week's rest for consolidating the concrete before commencing the adjoining ones. They are not bonded together beyond the ordinary hoop-iron strips which I use in tank walls. A section or block can be completed in four or five days, when the timber is at liberty for another portion. There is no fear of inequality of settlement, as the ground at these depths is incompressible by an ordinary tank wall; and Portland cement work will not, under any form of construction, admit of movement after a few days' completion.

The method described has the following merits: (1) It removes all risk and expense due to a large, exposed, continuous earthwork trench, full of timber, and kept open sometimes for months. (2) The tank can be pushed forward and operated, at same time, on the four quarters of the circle. (3) The earth pressing behind the wall is maintained in its natural cohesive condition; being exposed only for a very short time. A less thickness of wall is therefore required for the same tank. (4) Backing of newly-made earth, which is usually scamped, is dispensed with.

The cost of this tank was 1·6d. per cubic foot of internal tank capacity—being the area of the top water multiplied by the clear depth of the side wall, above the floor of the tank; and this for a tank with 20 per cent. extra strength of side wall to resist the swelling tendency of the tough clay behind, when exposed to atmospheric conditions.

* See JOURNAL, Vol. LIII., p. 803.

Mr. WYATT's second paper was entitled—

ANOMALIES IN GAS UNDERTAKINGS.

About 2500 years ago, the almond-eyed, yellow Chinaman, Confucius, was asked by one of his followers for a word as a rule of conduct, when he replied, "Reciprocity." This word, in its most comprehensive meaning, of the so-called "barbarian," covers the moral codes of most communities and nations. Gas companies need to practice more largely this virtue of reciprocity, and study the interests of their customers, the consumers of gas, to the utmost; giving them the best value in good gas for the rates charged. Emerson wrote years ago: "When I asked an ironmaster about the slag and cinder in the railway iron, 'Oh,' he said, 'there's always good iron to be had; if there's cinder in the iron, 'tis because there's cinder in the price.'" This is reciprocity with a vengeance, and has a commercial taint about it. In the remarks which I shall make upon this subject, I shall endeavour, as much as possible, to speak from the consumers' point of view, or standpoint; so that we who are on the gas or tested side of the screen may view the light by which we are regarded by our customers and the public.

Gas undertakings have their rights, parliamentary and otherwise; but they have also their duties. The manufactured article—coal gas—which they retail to the public, should be worth the price charged for it, and that price should be the most reasonable possible, consistent with net cost and fair dividend, where the monopoly in the supply of the article is, as in this instance, protected by an Act of Parliament. There should be a mutual interchange or reciprocity of interests between producer and consumer, to induce that feeling of perfect peace and satisfaction between the contracting parties, which alone can insure the perpetuity of a monopoly in this very free country. The gas undertaking, of course, must pay its reasonable dividend to the shareholders, who find the backbone of money to carry on the concern. But still the consumer and customer should be respectfully and even tenderly treated, and supplied with the best article for his money, as he cannot as a rule go to any other source for light than the gas company. All monopolies should be merciful when they are fully fledged with powers; and they should be able to do their business cheaper and better than the merchant or private trader can. Otherwise the pervading and almost universal-suffrage instincts of the gas constituency will combine, sooner or later, and assert itself in its impatience, by some new departure. Take the example of the railway companies at the present time, where we find that about 6 or 7 per cent. is the highest limit of dividend paid; and where, in many instances, Parliament has contradicted itself again and again after pressure from without, and granted triple competition to the leading towns on the main routes of traffic.

The Government and constituencies of the country have a mortal antipathy to perpetual monopolies. This is most noticeable in the output of men's mind work, in the shape of literature copyright and patents, where the exclusive profits on a man's creations are limited to a few years, and then handed over to the community for common use and benefit. Perhaps this is wise and just; or some people and their posterity would grow too rich and aggressive. Again, it is not quite wise to incense the gas consumers too much, as in some recent cases where gas companies, with ample revenues for paying dividends of 7 to 8 per cent., and with a falling market in coal prices approaching 20 per cent., have suddenly raised their charges for gas 12½ per cent. to keep up high dividends. The power of charging under the sliding scale is delightfully simple! The vestries and consumers become exasperated beyond measure, or, as one of the district boards said, "the gas company is sticking it into us rather warm."

It may be asked, "Is it prudent to stir up these wasps' nests without the most urgent necessity?" The railway companies dare not charge up to their maximum rates, and they have no sliding scales. Were they suddenly to lift their fares 12½ per cent., you can fancy what a rumpus there would be from one end of the country to the other, especially among third-class radical riders. At one time the railway companies got into the habit of paying a 12 per cent. dividend, or something like it, when there ensued a railway mania, and the Committees of the House of Commons let slip the dogs of competition, by granting double and triple lines to the same points, and brought down the high bearing of these corporations. We must sooner or later convince the gas consumer that the gas-providing company can and will supply him with one of the necessaries of life—artificial light—at a more economical charge than can be done by the ordinary trader; and this in exchange for a monopoly of the supply from Parliament.

The sliding-scale system of working, under which many of

the gas companies assess their charges for the supply of gas, will have to be, as has been expressed of the House of Lords, "either mended or ended." In its present form it is very confusing to the consumer—"a sort of red herring drawn across his path, to take him off the true scent," as alleged. Different companies under the sliding scale have different standards, whence to deduce the rise or fall of dividend and price. The standard usually is not a reasonable one, and is not based upon the current prices of coal, gas residuals, or wages; it is purely conventional, and fixed at the mere caprice of a Parliamentary Committee, assisted by sharp-witted barristers who have "axes of their own to grind." The standard rate should be based upon economical grounds, as, for instance, where, as in the best-managed undertakings, 16-candle gas is sold at the rate of 2d. per 1000 cubic feet for every 1s. per ton of coal delivered in the retort-house (as was the case in London a year or two ago, and even is so at the present time here at Newcastle, Leeds, and elsewhere). This is a fair and economical rate as a standard for a gas company, especially so when the net cost of the gas, including distribution, amounts to about 1¼d. for every 1s. per ton paid for coal. This would make the London standard about 2s. 6d. instead of 3s. 9d. Take an instance away from home, that of Brussels, where the coal formerly cost 16s. 9d. per ton, and the charge to the consumer was 2s. 8¼d. per 1000 cubic feet. Now coal has gone up there; and the price per 1000 cubic feet is 3s. 1¾d. In London at the present time, with coal costing in the retort-house about 15s. per ton, the charge for gas over two-thirds of the Metropolis has gone up to 3s. 1d. per 1000 cubic feet—all owing to the sliding scale, with, as you all know, the grandest demand for gas per mile of main on any ground or district in the world. The corporation undertakings stick well to their rates, and do not jump up and down like a Jack-in-the-box in their charges, and irritate their customers by constant changes—because they have no sliding scales. Still, their rates are too high; and they follow the very questionable principle of causing the gas factory to lay the golden eggs for an annual subsidy to the town rates; thus making the gas consumer pay virtually higher rates than his non-consuming neighbour, to provide town improvements and statues to defunct local celebrities. The corporation undertakings will, however, in the near future, by means of their sinking funds, have the pull on company schemes in being able to wipe out their old overcharged capital accounts; and, whenever they chose to sell gas at cost price, throwing dividends to the winds. Then will come the tug of war, and a *regimé* under which the company undertakings, capitalized up to the hilt, will have their work cut out for them.

The capital accounts of the company undertakings should be consolidated, reduced, and rearranged in order to make them comprehensible to all who have money to invest, and to insure a juster distribution of the profits among the proprietors. All priorities and preferences of dividends should be dispensed with in sound concerns, and only be visible in the balance-sheets of semi-bankrupt schemes, where the original shareholder goes to the wall. The capital could be readily consolidated into a 5 per cent. stock, as is now being done by some of the companies under Act of Parliament; and then it could be gradually reduced in amount, half year by half year, by a sinking fund of 1 or 2 per cent. annually. This should be continued over such a reasonable period as would reduce the capital to an amount corresponding to the true structural value of the works and plant, excluding all bogus or watered stock which had been created from time to time. The *nominal* capital of the undertaking should be its *real* capital—that is to say, such an amount should be written in the company's books as would at any time reinstate the works and plant. Thus, we know that for gas-works of a manufacturing capacity of one million cubic feet per diem the capital cost need not exceed £5 for each ton of coal carbonized a year; and for works of a greater capacity than this, the cost need not be more than £4 per ton of coal carbonized. This computation will give sufficient capital to provide an efficient establishment and plant to supply gas to a district. Upon these figures alone should interest be paid; and at this point must all sound gas undertakings arrive sooner or later. Some of the corporation works have, by means of their sinking fund and other arrangements, brought down the capital to as low, in one case, as £1 10s., and in another to £2 per ton of coal carbonized a year. It is not, however, desirable to reduce the capital below the structural value of the works and plant, as consumers of gas in a town should pay for its true cost, including interest upon capital. The different classes of stocks which are found enumerated in the balance-sheets of some gas companies, such as "ordinary," "preference," "debenture," and so forth, should be gradually sponged out. Take the instance of one company, where there are eleven kinds of stocks (besides the premiated capital) on the Stock Exchange list, to bewilder the investor, and even to confound the artful stock jobber; and it takes something to do this. Verily there are many reforms necessary for the simplification and adjustment of gas stocks.

The amalgamation of the gas companies into grouped concerns, in well-defined districts of the country, would be a rare success; and it would conduce to good management and economy of working. Instead of a number of small gas-works dotted about the land, there might be a gathering together of several establishments into one proprietary and management—following in this way the practice of other joint-stock undertakings. Establishment expenses would be saved; and a uniformity and improvement in the general working of the business would result. Thus, take for an instance the economy and independence which could be insured in the business of disposing of the residuals from gas-works. A combination of several small works could have its own chemical, tar, and sulphate factory, placed in some central position, to which could be transported in the company's own rolling stock, at low freights, the whole of the tar and liquor produced at the several works, and there manufactured into saleable compounds, such as benzole, naphtha, carbolic acid, creosote, anthracene, pitch, black varnish, sulphate of ammonia, and so forth. This would get rid at once of the middleman, who runs away with the lion's share of the profits, and rigs the market. In these combined establishments could be concentrated the best plant, chemical ability, and the soundest trading knowledge to be found in the country, as the ready money would be there to pay for these requisites. The raw material comes in regularly to be manufactured and disposed of, free from the outside riotous competition of the market. Gas companies operating with this combined strength might, and should, dare to go to Parliament and ask for an Act to enable them to purchase and work a coal mine for their own exclusive business; and they would thus operate a flank movement on "coal rings" and other manœuvres in that sublimely black art, the coal trade. A railway company is now permitted to roll steel rails, manufacture locomotives, rolling stock, and plant, and carry out other works for its exclusive use; and why should not a gas company win its own coal for its own operations? By the amalgamation of smaller concerns into a large combination, the companies would present a bold front, and even the House of Commons could be faced.

A gas undertaking should not only manufacture coal gas and fructify its residuals, but should also perform the whole work of distribution of the gas up to the point of consumption—the burner; including service and house pipes, meters, and ordinary burners, at an inclusive price per 1000 cubic feet, giving reliable information to the consumers as to the best method of consuming the gas with proper burners, ventilation, &c., to prevent the discolouration of ceilings and walls of decorated rooms, which latter nuisance has done more than anything else to introduce electric lighting into first-class residences. The finishing touch of gas distribution should not be handed over to that objectionable unit, the plumber, either "registered," "licensed," or "unlicensed," whose hand creeps into your pocket before you can say "Jack Robinson." There are many houses in which there are two sets of service pipes and fittings; the first lot being so unskilfully laid and fixed that they could not be patched further, and so a second set of services had to be laid on new and better lines. Given a first-class set of floors in a house, perfectly joisted and sound; and a plumber or gas-fitter is the best man you can find to weaken the same. In my own case, the plumber refused to put in a set of revised house-service pipes according to my directions, as he said it was not "tradesmanlike;" and so I employed one of my foremen carpenters on the job, who turned out a rational and economical result in place of the first attempt of the plumber, which was botched and costly. That man has to be much pitied who grants *carte blanche* to a plumber in carrying out a job. I observe that some of the gas-fitters now adverties, under the auspices of the gas companies, to provide and fix house services, plain gas-fittings, ordinary gas burners and meters on the "hire system" for an inclusive price of 2d. per week for the smaller houses, at rents up to about £30 a year, or at an extra charge for gas of about 6d. per 1000 cubic feet. The gas companies are only just beginning to come in touch with their customers, and practice ordinary business tact in their transactions. They will have in the future to undertake all the detail work of introducing gas into a house, including the inspection and upholding the fittings from time to time, and reasonable wear and tear, for an inclusive gas-rate; and then they will do a roaring trade in artificial light.

The present method of assessment of gas-works for "rateable value" is most objectionable. The experts and counsel employed on appeal-rating cases have mystified the course of procedure in the Courts most mightily—and all for costs. They have trotted out the "hypothetical landlord" and the "hypothetical tenant"—who are mere creatures of the imagination, bogies conjured up to frighten companies and owners of gas properties, and to increase the rates. These hypothetical "bogie men" are not even alluded to in the Parochial Assessment Acts. Persons, imaginary or otherwise, are not alluded to therein; there is only the word "hereditaments," which means that only absolute fixed property, "lands and tenements," are to be valued. Nothing is said about tenant's profits or business incomes derived from the use of the "hereditaments," and created solely by business skill. The structural works only can be dealt with for rating purposes; the business profits of a company or owner are not involved in settling the rateable value of a property; for these are brought into account under the Income-Tax Acts and specially taxed. If we have to recognize the "hypothetical landlord and tenant," we shall some day get into a great fix on a rating appeal, where the *real* tenant may be marched into the witness-box, backed up by a syndicate offering to take over the concern

and pay a fixed yearly rent for the same; and upon this, it may be argued that the *rateable value* should be apportioned. In such a case this proposed *real tenant* might offer (and call it a rent) even a greater sum than the then net business profits of the company, as, possibly he, as a keen manager and business agent, might economize on many items of expenditure, overlooked by companies' salaried officials. The only safe and just mode of procedure to deduce the "rateable value" of gas-works is to take the structural or present cost value of the works as a basis, pure and simple; and perhaps no better course can be adopted for this purpose than to estimate such value from the total tons of coal carbonized each year at the establishment, and multiply this figure by £4 for the larger, and by £5 for the smaller works, being the true cost of gas-works. To arrive at the "*gross* rental value," take the annual interest paid by the gas company for this sum; and by deducting one-sixth, we deduce the "rateable value" of the property and works, appraiseable under the Parochial Assessment Acts. Here we have a foundation from which to evolve the rent, or annual interest payment, as a rent, for this expenditure of capital.

Let us assume, for example, that each ton of coal carbonized per year requires, in the language of the Act, for fixed "hereditaments" and structural works to utilize the same, an outlay of £5 as capital. If this money be raised by the gas company at 4 per cent., then the clear rent or interest to be paid for this outlay would be 4s., which is the "gross yearly value." From this has to be deducted one-sixth, in ordinary cases under the Act, for taxes, rates, and insurance (although manufactories in the Valuation Act are allowed one-third, as a deduction, and why not gas factories?), to arrive at the "rateable value," which would be 3s. 4d.; and on this latter amount the assessment of so much in the pound would be made. Supposing the rates to be levied at 5s. in the pound, then the amount payable for rates to the parish per ton of coal carbonized per year would be $40 \div 4 = 10$d. per ton. Also, if the works were of the larger type, then the rate would not be more than 8d. per ton of coal carbonized per year. There is one large corporation gas-works which pays 10d. per ton of coal carbonized per year for rates; and one gas company which pays 8d. per ton of coal. I will not mention names lest these may be surcharged like other properties, and swooped down upon by the assessment vultures and brought to account. These are wonderful exceptions to the rule, and must be spoken of with bated breath. Some gas undertakings are mulcted in double these amounts for rates, and pay 1½d. to 2d. per 1000 cubic feet of gas sold.

In one rating appeal, recently decided, as to the Drainage Outfall Works at Woolwich, in 1891, a reasonable decision was arrived at, where the structural value of the buildings, and first cost of the land, were alone taken into consideration, and the "gross rental value" for assessment was taken at 3 per cent. on the prime cost of the land, and 4 per cent. on the structural cost of buildings and works; and from each of these amounts one-sixth was deducted as statutable deductions to arrive at the "rateable value," upon which the actual rate, say, of 5s. in the pound, was chargeable. An Act of Parliament was proposed in 1887 for Scotland, whereby the "gross value" was mentioned at 3 per cent. on the structural value of water-works, less one-sixth for deductions, repairs, &c., to arrive at the "rateable value" for assessment. In many appeal cases the results have been astounding; as, in one instance, where an amount for assessment was put down at £45,000, and was reduced on appeal to £12,000. Discrepancies quite as wild in their claims are continually cropping up. The present mode of trying assessment appeals is ruinous and awful in its results. One recent case occupied over twenty days in the hearing; and it absorbed the united talents of twenty-nine barristers, a legion of experts (who were too numerous to count) swearing unheard-of inventions, the one against the other, and at a cost of upwards of £30,000. Truly we shall soon be devoured by professional locusts, and have not a wing to fly with. One expert was asked why he valued differently in certain-named cases. He replied: "If I were valuing for a landlord, I should go one way; and if for a tenant, I should go another." Chastened individual! And yet this expert was on his oath, and he is "an honourable man." As Mr. Commissioner Kerr said in a case at the City of London Court, a few weeks since: "You can get any opinion you like to pay for." So much for the battledore and shuttlecock play with the "hypothetical landlord and tenant," in Courts of Law called justice.

The standards of light used and proposed for testing the illuminating power of coal gas are in an unsettled condition. The sperm candle, as a standard, is very primitive, unsatisfactory, and pleases no one. Each and all complain of it; and yet all English gas companies and Acts of Parliament bow down before it and adopt it. The everlasting sperm dip of the brimstone-match period holds on as the standard of light, and defies the scientist to kick it aside. One authority says: "Photometrists have very little knowledge as to causes of variableness of the candle. It is a mere rule of thumb. In the published papers, a difference of from 1 to 4 candles is very conspicuous between the tests made on a constant quantity of gas. Candle experiments have been made in the past at random. The wicks were anyhow." Another authority says: "An examiner can report gas 1½ candles higher than another by employing candles in two different ways; there is a difference between using fresh candles and those used several times." And so on, and so on, *ad infinitum*, to the discredit of the ancient candle, and to the folly of the generations who have been bored and misinformed by it so long. Experts might say, on the part of the consumer, why not then abolish forthwith the candle and the tallow chandler, as a standard test light, and give us the full value in sperm, say for a 16-candle standard, $16 \times 120 = 1920$ grains of sperm, consumed in a lamp per hour, under the best conditions.

The standard sperm burner, some think, should have devoted to it as much skill in its manufacture, and be as good in design as well as use, as the London Referees' standard burner, which goes on the opposite side of the photometer screen. Both burners would then be equal, at their full power, and complete lights, and be placed in juxtaposition with each other; and therefore the atmospheric, barometric, temperature, and other environments, would be identical for both burners, and dispense with corrections. There would be a burner at each end of the photometer, equi-distant from the disc fixed in the centre. The London Referees' standard burner for gas with 24 holes, a 6-inch chimney, 1⅛ inches diameter, for 16-candle gas, consuming its full quantity of 5 cubic feet of gas per hour, brings out the maximum light (short of a regenerative burner); and when brought into use some years ago it raised the value of the gas about 1½ candles—say, 10 per cent. Then why not, it might be said, give the same chance to the full development of a 16-candle sperm standard burner? Supposing the Referees' standard burner was split up into sixteen jets of light, as is the case with its humble rival, the sperm candle in the photometer, what sort of a show would it make? If you compare lights the one with the other, in rivalry, let them both be the best of their kind, with their respective light qualities fully evolved.

The late Mr. Keates proposed a 10-candle sperm-oil standard burner, with a moderator lamp; but it seemed to war against certain interests, and was avoided. The French use a Carcel lamp of 9½ candles, with colza oil specially tested for the purpose. The 16-candle sperm compact burner would be more comprehensible to the consumer as a standard, and at the same time consume the legal weight of sperm, but *minus* the tallow chandler and his wicks, than the new proposals of a petroleum vapour lamp with a Greek name (how people do like Greek names for their creations, instead of Anglo-Saxon ones); or the slotting off portion of the same gaslight, which is to be tested an eighth, and calling it a standard burner, which latter must, of necessity, partake of the qualities of the gas tested, being identical in nature—whether it be good, bad, or indifferent. Like should produce like, say or think as we will, and qualify, as we may, by words such as "average," "approximation," and so forth. We can multiply the standards of light as we please, by setting up other standards of equivalent light value. Thus we can have a 16-candle standard on the French Carcel system, burning colza oil, which is said to consume 1092 grains of colza per hour for this amount of light. Or we can have the best lamp for consuming refined mineral oil for the same light power. A rape-oil lamp of 16 candles is supposed to consume 2500 grains per hour. In all and every case the standards would be identical as to light, and the number of grains of lighting material consumed in each instance would be regulated to insure the desired result. I apprehend we could soon devise a just standard of light for photometric purposes, if only the demon of "vested interest" could be snuffed out and prevented from intervening in scientific matters, by taking away the common sense of rival parties. Men may come and men may go; but clique goes on for ever.

Let us have "reciprocity" of interests between the gas producer and the consumer; let the monopolies live and flourish if you will, but let us have reasonable, legal, nay, moral checks, not only to insure the best article for the money paid, but also to induce peace, goodwill, mutual benefits, and ample light, nay, more light—mental as well as physical.

Discussion.

Mr. J. HEPWORTH (Carlisle) remarked that, as he came along that morning, the thought occurred to his mind that it would be a very great advantage if the members could have prints of the papers before they heard them read; and he was the more of this opinion after hearing such valuable contributions to their proceedings as those to which they had listened. He had always looked upon Mr. Wyatt as a model engineer in gas matters. But after that day he thought he should regard him as a model statesman; for certainly his paper was full of statesmanlike wisdom concerning the anomalies of gas undertakings. If they could bear in mind his leading idea—reciprocity—they would possibly escape some of those anomalies. Mr. Wyatt had, at any rate, pointed out very well how they ought to make the attempt. He (Mr. Hepworth) listened with great interest to Mr. Wyatt's references to the sliding scale. Of course, that did not affect him very closely, because he happened to be connected with a Corporation gas undertaking; but he was much struck by the suggestion made by Mr. Wyatt, where he put forward 2d. per 1000 cubic feet for every 1s. per ton of coal as an equitable basis for fixing the price of gas. The contrast he put before them, of Newcastle and London, would, he (Mr. Hepworth) thought, do something to emphasize his view. It was, of course, a difficult problem to work out; and they would no doubt find it many-sided when they came to apply it to their several undertakings. But it was a statement that was

worthy of all the consideration they could give it. He ventured to say that round this point they should turn their thoughts many a time after that day; and if some of them happily (or unhappily, it might be), deviated very much from a standard of this kind, they would very likely ask themselves the reason why. Everyone, he thought, would agree with Mr. Wyatt as to the desirability of putting the capital accounts of their undertakings in a clearer light. It did look somewhat absurd to see, as they did in the case of one Company, no less than 10 or 12 different kinds of stock. Simplicity ought certainly to be possible in these days, after so much experience in the conduct of gas undertakings, and so much legislation upon gas accounts. He should be very glad if it were in the power of the Association, or of any of their members, to do something to further this object. Mr. Wyatt made a suggestion with reference to the rate of dividend upon capital, which struck him as being not only somewhat new, but certainly most valuable. It was obvious that corporations who had largely reduced their capital would be able to run a very good race with private companies who had done nothing in that way. Mr. Wyatt's suggestion that shareholders in gas companies should be content with a return of 5 per cent. on their capital, was one which he (Mr. Hepworth) thought those who represented companies might very well consider. In conjunction with this there should be a setting aside of a reserve, which would, in course of time, be the means of extinguishing the burdensome capital which was on many undertakings. For instance, if their capital to-day stood at £100,000, and the works might very fairly be taken as of a structural value of only £80,000, and if 2 per cent. per annum, or whatever might be agreed upon, were applied to the reduction of capital until they made their capital and the value of their works equal, this would be a sensible course to follow. With reference to amalgamation, he thought he knew several districts in which amalgamation would be exceedingly valuable. He had heard it mentioned in that room as being the dream of some of the engineers who sat round the table; but there could be no doubt that, where amalgamations were possible, they might, as was done in many other industries, reduce the standing expenses. They could, by the treatment, in a wholesale way, of residuals and other matters, do a good deal to increase the prosperity of several undertakings. But, of course, even amalgamation was a question which had two sides. It was exceedingly doubtful, for instance, whether any advantage had accrued, by amalgamation, to a Company of which he was thinking—a Company which had to deal with nearly 20,000 tons of sulphate a year. He very much doubted whether this Company had benefited by amalgamating the whole of its undertaking. At all events, the Company, by the sale of their liquor, a few years ago produced a much larger return for residuals than they could now. It seemed as if the middleman had not been moved quite out of the road in that particular case; and unless they adopted the very best means of disposing of their residuals, when dealing with them in a large way, they might not gain by amalgamation. These remarks, however, need not be taken as an argument against amalgamation, but as one for better management. He was highly pleased to hear what Mr. Wyatt said about rating. A much simpler basis than the existing one should be arrived at; and in his paper he had given them one, based, not only on reason, but on the illustration of the London sewage works. He (Mr. Hepworth) was not quite sure how it would work out in each individual case; but if they could adopt a basis such as that which had been suggested by Mr. Wyatt, it seemed to him that it would be a good basis. With respect to the standard of light, he was sorry he had had no experience with the Carcel lamp; and therefore he did not know if the consumption of sperm oil in the way suggested by Mr. Wyatt would show any advantage over that lamp. But it seemed to him that it would be an exceedingly sensible thing to dispense with the wick which they had used for so many years, and consume the oil in the way suggested. He hoped someone who had not too much respect for the vested interests would proceed, as speedily as possible, to the manufacture of an oil-lamp by which this matter might be tested, and as there was now a Standards Committee, as he might call it, he should very much like that this question of the consumption of sperm should be fully considered by them in the way referred to by Mr. Wyatt. With respect to the excellent paper by Mr. Warner, he could not help noting that there was a strong desire on the part of those who were interested in gas matters to secure a fair adjustment of opposing interests. This was the origin of the sliding scale. He did not know that anyone there would contest one of the points raised by Mr. Warner. For his own part, he thought Mr. Warner had been exceedingly fair throughout the whole of his paper. Speaking generally, it certainly did appear to him that the sliding scale ought to be one of the happiest ways of adjusting opposing interests; and yet it came to be objected to when, under it, a dividend of 12 or 14 per cent. was paid—a situation which reminded him of the man who said "there ought to be a voluntary rate, and everybody should be compelled to pay it." People could not see why they should pay never too low a price for gas, when dividends were going at the rate of 12 or 14 per cent. It was very likely that the sliding scale would some day be brought up for reconsideration. He had had his faith in it shaken very greatly by its application to residuals. He was more and more distressed when he thought of the losses sustained by those (he was not one of them) who had sold their residuals upon the sliding scale; for he was perfectly certain that when the price of sulphate, for instance, came to a very low figure, there was no inducement whatever for a manufacturer to do anything to get out of the low prices. All his interest was in keeping to the sliding scale—keeping the price of sulphate low—because the profits were shared all the same; in fact, he (Mr. Hepworth) was not sure the manufacturer's profits were not larger than when the price was high.

Mr. L. H. Armour (Gateshead), referring to the sliding scale, said it was very agreeable to the consumer when the price of gas came down; but he was irritated when it was obliged to go up. There were two things the public needed. The one was the lowering of the price; and the other, in his humble judgment, the raising of the standard of the gas. There was no provision in any Act of Parliament, as far as he was aware, whereby the dividend was made to depend in any way upon the standard of the gas. And yet, how often did one hear of the standard in a discussion upon the quality of gas in different places? Many would rather have a better gas supplied than get the trifling concession in price. He spoke not merely of private opinion, but of that of corporate bodies. It seemed to him that this would meet one of the points set forth among the many that were worthy of consideration in the excellent paper by Mr. Warner. If the dividend to the proprietor did not depend altogether upon the price, but upon the standard of the gas supplied, there might be a certain amount of grumbling if the quality was reduced; yet the lowering of the quality to accommodate the dividend would certainly make it less irksome to the public.

Mr. M. Richley (Shotley Bridge) said the gentlemen who had spoken were gas engineers; but he might be allowed to say a few words from a non-professional standpoint. How did the anomalies arise of which they had heard? One engineer told them that the cost of construction of a gas-works was £250 per million cubic feet capacity; another gentleman had stated, before the Association, that it was £350; whereas Mr. Newbigging, in his "Handbook," said it was from £500 to £600. They need not be surprised that anomalies should find their way into gas-works, when they met them at the commencement. He quite agreed with Mr. Wyatt as to the mode of assessing gas-works. But when they put experts into the witness-box they might advocate that the assessment should be made upon the structural value; or, if the company had a high capital and low profits, they might advocate that the assessment should be upon the profits. In each of these cases, they could bring legal opinion of the very highest authority to support their view. As Mr. Wyatt had said, the capital cost was brought in in the case of sewage works. This, however, had nothing to do with it, because in all that county the mode of assessing iron and other large works was only by the structural cost.

Mr. H. Lees (Hexham) thought the most important point in Mr. Wyatt's paper was that of the control of the gas to the point of ignition, upon which he laid special stress. If this were adopted, it would, to some extent, meet the objections Mr. Armour had raised as to complaints about the quality of the gas. The probability was that, in many cases where complaints did arise, the defects were to be traced entirely to defects in the consumers' fittings. If they had full control over these, all defects could be remedied. Mr. Wyatt was somewhat strong in his denunciation of plumbers. His own experience was that this was the case in every town. Gas managers had frequently great difficulty in getting regenerative lamps introduced. The plumber would not look at them. If the gas manager recommended a regenerative lamp, the plumber suggested something cheaper, but which, to the consumer, might be much more expensive. If the manager made a suggestion, the consumer seemed to be somewhat doubtful as to his sincerity. He (Mr. Lees) was certain that, if they took over the full control of the gas, they would benefit to a very large extent.

Mr. Wyatt said he was very much obliged to his friend Mr. Hepworth for the very able way in which he alluded to his paper. It was his intention in the paper merely to throw out suggestions of which they might make something. What they wanted were exact figures—something fixed. Let those anomalies go to the winds, and let them have something which would help them to get rid of subterfuges.

Mr. Warner, on rising to close the discussion, showed a piece of flexible metallic tubing, with which, he said, he had been very much pleased. It had been tested to a very high pressure, and would be suitable for water as well as gas. With regard to the reductions of capital, he thought the best answer to this was the premiums they obtained; and where they had the sliding scale they effected that. He did not think the sulphate incident was a reply to the advantages of amalgamation. He had written a few notes—strange to say, only on the previous night—upon this very point of the advantages of amalgamation, with special reference to the Newcatlse district; and he supported Mr. Wyatt in what he had said upon the subject.

Votes of Thanks.

Mr. T. Bower (West Hartlepool) proposed a vote of thanks to Mr. Wyatt and Mr. Warner for the very able papers they had submitted. The members would agree with him that they were all very much indebted to the writers of these papers, not only for the services of that day, but for the very valuable aid they

had rendered to the Association in the past. He was thinking, as he sat there listening to the papers, that the example set by these two pioneers was very worthy of emulation by some of the younger members of the Association. If they only had those gentlemen coming forward with papers as freely as they had Mr. Wyatt and Mr. Warner, he was quite sure that, in the future, the Association would maintain the high standard it had reached.

Mr. W. FORD (Stockton) seconded the motion. He said he thought the pleasant sarcasm which ran through Mr. Wyatt's paper ought to be the means of stimulating the younger members to the reading of papers. The older hands were not only getting more advanced in years, but were less inclined to exercise what was supposed to be their maturer judgment. These were the days of higher education; and the more ancient had a good deal to learn from the younger members. He felt very deeply the President's reference to the loss the Association had sustained by the removal of their dear friend Mr. Cox's son. If he had been spared, he would have shown such an example as would have conduced not only to the advantage of the Association, but have induced others to follow in his footsteps.

The motion was carried.

Mr. WYATT, in acknowledging it, said that reviewing one's experience, in a paper such as he had given them, made him feel a younger man. He agreed with what Mr. Bower had said as to the junior members giving their experience. Every man possessed a certain amount of originality, and only required to bring it out. Let them all speak—each in his own way; or the younger members might give papers which would assist them in their theories.

Mr. WARNER also returned thanks.

The remainder of the proceedings have been already reported.

Proposed Official Inspection of Tar-Works.—By the Bill which has been introduced this session to amend the Alkali, &c., Works Regulation Act, 1881, tar-works—that is to say, "works where gas tar is distilled or is treated in any manufacturing process"—will be included in the scheduled works coming within the operation of the Act. If the Bill passes, it will come into force on April 1, 1893.

Death of Mr. F. C. Hills.—We regret to announce the death on Tuesday last, at his residence, Redleaf, Penshurst, of Mr. Frank Clark Hills, whose name will be remembered by most of our readers in connection with his process for the purification of gas in closed vessels, by employing the ammonia contained in the gas as the agent in arresting other impurities. It may be recollected that shortly after the meeting of The Gas Institute last year we had occasion to mention that Mr. Hills was in a very bad state of health; and this condition unhappily continued until his death, which took place at the advanced age of 84.

The Measurement of High Temperatures.—At the first *conversazione* of the Royal Society for the present season, which took place at Burlington House last Wednesday, Professor Roberts-Austen added a further example to those he has already given of the great service the measurement of high temperatures can render in revealing the molecular structure of metals and alloys. He exhibited the optical pyrometer of Professor H. le Chatelier, of Paris, who has done so much within the last few years for pyrometry. By an elaborate arrangement, Professor Roberts-Austen demonstrated the method of eliciting the concurrent testimony of a thermo-junction and of the optical pyrometer as to the temperature of a glowing mass of platinum heated to whiteness. The temperature of an incandescent electric lamp, as indicated by the latter instrument, proved to be 1850° C., or less than a fourth the latest estimations of the temperature of the sun.

Death of Professor Hofmann.—We regret to record the sudden death last Thursday night, as the result of an attack of pulmonary apoplexy, of Professor August Wilhelm von Hofmann, the celebrated chemist, and the discoverer of the aniline dyes. While still a young man, he devoted himself, under the direction of Liebig, at the University of Giessen, to the study of the bases of coal tar and the metamorphoses of indigo; but it was not until several years later that his important discovery was made regarding the composition and chemical character of analine red—a discovery the importance of which to the industry of the world, in connection with the manufacture of coal-tar dyes, cannot be over-estimated. After spending three years at Bonn, Professor Hofmann was, in 1848, on Liebig's recommendation, appointed Superintendent at the Royal College of Chemistry in London. The institution made rapid progress under his direction; and in 1853 it was merged in the Royal School of Mines as the Chemical Section. In 1855, Professor Hofmann was appointed by the British Government a Warden of the Royal Mint. In 1864 he was selected to fill the Chair of Chemistry at Bonn, whence he was summoned to Berlin in the following year; and he occupied the Professorial Chair of Chemistry there until his death. He made numerous contributions to the *Annalen der Chemie*, to the Transactions of the Chemical Society, and to the Philosophical Transactions of the Royal Society, of which latter institution he was elected a member in 1851, in recognition of his services to science. In 1854 he was awarded a Royal Medal for his "Memoirs on the Molecular Constitution of the Organic Bases." Professor Hofmann was in his 75th year.

THE CONSTRUCTION OF LARGE GASHOLDERS.

Should External Guide-Framing be Abolished?

The Salford Corporation Gas Committee lately had under consideration the construction of a four-lift holder, 150 feet diameter by 120 feet deep; and the question occurred as to the advisability of dispensing with external guide-framing. This matter was fully discussed between the Mayor, Mr. Phillips (the Deputy-Chairman of the Gas Committee), Mr. S. Y. Shoubridge, and Mr. George Livesey; and the last-named gentleman was asked to submit a written statement of his opinions on the subject. It was as follows:—

Experiments with a view to the improvement of almost all parts of gas apparatus—although probably nineteen out of twenty will be failures—are necessary for the advancement of the industry. The failures being merely a money loss, can be estimated and provided for; but, in the case of large gasholders, experiments which may fail and wreck the holder, and cause irretrievable damage and loss of life, are out of the question. Before adopting radical alterations in large gasholders, there must, above all things, be a perfect assurance of their safety. A guarantee by the maker or the inventor of the new system, is not sufficient, because no mere money pledge, or an undertaking to restore the holder in the event of failure, can either provide against, or compensate for, a disaster such as might easily result from the destruction or overturning of a large gasholder.

The question, therefore, is not only whether large gasholders without external guide-framing are safe, but also whether those who are responsible for ordering their erection are thoroughly assured of their safety. There must be no doubt about it, just as the designers of the Forth Bridge assured themselves—and, to be perfectly safe, they put excessive strength into the structure—that under no conceivable conditions, except an earthquake, could the bridge fail, as the unfortunate Tay Bridge failed, and cost over a hundred lives, a few years previously.

I willingly give both to Mr. Gadd and Mr. Pease every credit for the great ingenuity of their respective inventions; and to small holders of not more than two lifts, which do not rise to any extent above the surrounding buildings, I have little doubt that either invention may be safely applied. But when we come to the large holders which are now becoming so common, and which tower to great heights into the air above all other erections, and are thus exposed to the full force of the wind, the circumstances are entirely changed. I have myself, at the top of a gasholder 90 feet high at the Old Kent Road, London, in a gale in 1881, seen a gust of wind balance more than 5 inches of water in a "King's" pressure-gauge—equal to a pressure of 28 lbs. on the square foot—though this was probably not over a large area. To be safe, however, it is necessary in this country to provide for a possible wind-pressure of not less than 40 lbs. on the square foot, which on the large area exposed by a gasholder is a maximum not at all likely to be exceeded. But this is not all. It is quite possible to have snow and wind combined; and as the snow will be deposited in the greatest thickness on the leeward side of the crown of the holder, the wind and the snow will both tend to overturn the gasholder in the same direction. Hence the necessity for the strongly-braced guide-framing which is always applied to large and lofty gasholders.

If to resist the overturning forces of the wind and snow, separately or combined, guide-framing such as is commonly seen is necessary—and I firmly believe it is—it follows that, if the guide-framing be abolished, the forces acting on the gasholder which it (the guide-framing) has hitherto transmitted to the ground, must be transmitted through the gasholder itself, which being of circular form, and constructed of thin sheet iron, is not suitable for that purpose. With external guide-framing, there are practically no cross strains or stresses on the sheeting of the holder; it has merely to carry its own weight. But take away the guide-framing, and the whole of the work hitherto done by it must be done by the side sheets, which will then be subjected to continually varying strains, and will in all probability cause them to become leaky at the joints, and to wear out sooner than is now the case.

To illustrate this, take an openwork wicker waste-paper basket; place it upside down on the table; and hold it down by what will then be the lower edge. Then bring horizontal pressure on the upper edge; and the distorting effect will at once be seen, which corresponds closely to the effect of wind pressure on the side of a gasholder guided or kept in position by attachments on its lower edge or bottom curb.

The tendency to distortion in gasholders without external guide-framing, is dealt with very thoroughly in Mr. Cripps's standard work, on "The Guide-Framing of Gasholders," published by Mr. W. King, of the JOURNAL OF GAS LIGHTING, which is well worthy of study by all who contemplate innovations in their construction.

Gasholders of large dimensions are in use, and others are being built with shortened guide-framing—that is one lift in a three-lift holder is allowed to pass above, and to rise quite clear of, the guide-framing, thus causing the side sheeting of the top lift to be exposed to the diagonal stresses above referred to. But these stresses are very slight; so slight in fact that

they may be ignored when that part of the gasholder which is unsupported by guide-framing does not exceed one deep or two very shallow lifts, or (say) a total height equal to one-fifth of the diameter, which would be exactly equivalent to one lift of your holder. If you were to allow the two lifts to go unsupported, the stresses would be greatly increased, in the proportion of one on the first to four on the second lift, to nine on the third, and to sixteen on the fourth; and these proportions apply not only to the sheeting but also to the rollers or attachments that would be used on the bottom edge of gasholders without external guide-framing. This rapid increase is due to the fact that two lifts unsupported expose double the surface to the wind, while the leverage is also doubled. Three lifts expose three times the surface, and the leverage is trebled; and so on. Therefore while one lift unsupported is undoubtedly safe, doubt at once comes in when an extension of the principle is contemplated; and, in my opinion, it would be wrong to run any risk until the doubt is completely and satisfactorily removed.

There is considerable uncertainty, not only as to the amount of force exerted by the wind, but also as to the effect of such force on a gasholder. A considerable reduction must be made for its cylindrical shape. I believe the French engineers take it in its resistance to wind pressure as equal to 57 per cent. of a plane surface. Therefore in the case of your gasholder, 150 feet in diameter, the equivalent would be 85 feet, which multiplied by the height, 120 feet, gives 10,200 square feet of surface exposed to the wind. For convenience, let us say 10,000 feet; and taking the wind pressure at only 28 lbs. to the foot, we find that there is a force equal to 125 tons tending to overturn the holder. But to be safe, taking into consideration the possibility of greater wind pressure, and also the danger of snow on the crown, it will be necessary to considerably increase the 125 tons as the possible force to be resisted. I think I should double it. But taking it at 200 tons only—because with an exceedingly strong wind, snow would not be likely to lodge on the crown to any extent—the rollers or attachments at the bottom curb will have to bear a much greater strain than they should be submitted to in the absence of external guide-framing; and be it remembered that it is quite impossible so to adjust them that each one does its proper share of work, and no more. The probability is that, under some circumstances, nearly the whole of the work will be thrown on two or three only; and should one or more give way, increased work would be cast upon those nearest to the broken ones—to be perhaps broken themselves in turn, and so on until the holder goes over.

It is also necessary that both guides and rollers should have a rigid and firm bearing. The rollers on Gadd's system, and the attachment of the wire ropes on Pease's system, being fixed to the cups and curb, are safe enough; but the guides are only attached to the sheets, or at intervals to other supports, which in neither case are, in my opinion, sufficient for safe working. It is also of great importance that, as far as possible, the rollers should be accessible, which is the case with a large proportion where external guide-framing is used.

For the above reason, I dare not erect, nor advise others to erect, a large gasholder without external guide-framing, and until I am assured of its perfect safety, I shall hold the same opinion.

(Signed) GEORGE LIVESEY.

P.S.—A gasholder without guide-framing may stand safely for many years, because it may not be subjected to a great storm. I have not seen a storm like that of 1881, since that time. The fact, therefore, that such a gasholder may work safely for a considerable time is no proof that it may not ultimately fail.

In the result, we understand that the Committee have decided to adopt Mr. Livesey's suggestion to erect the holder in question with the fourth lift going above the guide-framing; and Messrs Ashmore, Benson, Pease, and Co., Limited, of Stockton-on-Tees, have taken the contract for the work.

OHIO (U.S.A.) GASLIGHT ASSOCIATION.

Annual Meeting at Columbus.

The Eighth Annual Meeting of this Association was held at Columbus on the 16th of March, under the presidency of Mr. H. Wilkiemeyer, of Evansville, Ind.

The question of the representation of the gas industry at the Chicago Exhibition was considered at some length. Mr. A. C. Humphreys, of Philadelphia, having been introduced by Mr. Faben, gave an account of the steps that had been taken, similar to that laid before the New England Association,* and also particulars of some of the difficulties that had been encountered in the way of obtaining a suitable site for the building on the exhibition grounds. He also explained that, as the buildings for electric light exhibits were to be provided free of expense, and that a loan was to be granted by the government for the purposes of the exhibition, steps had been taken for the purpose of entering a protest, on the part of the gas interest, against the granting of such a loan, unless their industry also received proper consideration. As taxpayers, the gas undertakings contributed a great deal more to the government than electric companies, and therefore claimed that they had a right to at least equal privileges. Mr. Faben then moved a proposition that the Ohio Gaslight Association should heartily approve of the work done by the Gas Industry Council, and also earnestly protest against the unfair discrimination that had been exercised against their industry by the managers of the exhibition. Mr. M'Millin, in seconding the proposition, spoke highly of the work done by Mr. Humphreys and other members of the Council in connection with this matter. Mr. Cantine thought the resolution a little too mild; and that they might agree to request the Ohio delegates at Congress not to vote one dollar to the exhibition until the gas industry had been fairly and properly recognized. Mr. Printz agreed; saying that at his little works he could influence one gentleman at Washington. The resolution was then unanimously adopted. It was also agreed that copies of a protest suitable for laying before members of Congress be at once printed and circulated amongst the members.

The President then delivered his Inaugural Address. He referred with satisfaction to the steady and continual growth of the Association, which was not a trade union, but a society for the promotion of knowledge, and as such worthy of countenance and support from all. After a most eloquent account of the advantages secured by membership of the Association, he proceeded to refer to the prospects of the gas industry, insisting that "small profits and quick returns" was the sure road to success with gas, as well as with other things. At the same time, care should be taken to keep up the quality of the gas. A reference was next made to the present low price of tar, which was not likely to be permanent; and the President concluded by noticing several matters of local interest.

Mr. M. A. Gemuender read a paper on "A Basis for Equitable Rates to all Consumers." He defined an equitable rate as a fair proportionate return to each consumer for the actual payment received, treating all alike, without discrimination in favour of any one class of consumers. It did not necessarily follow that varying rates or discounts were evidence of discrimination; because one class of consumer or one kind of consumption might mean a different net cost to the company than another. In order to be just, all charges against a consumer must be strictly in proportion to the cost of the service given. It was therefore necessary, as a first step, to carefully analyze the nature of the service rendered to a consumer by a gas company. So far as manufacture and storeage were concerned, he argued there was no reason why a large consumer should receive any concession, as compared with a small one. But in the matter of distribution, a large consumer might claim that he cost the company less per 1000 feet used. Against this, however, distance from works might be brought in; and a small customer close to the works might claim to cost the company less than a large one at a distance. For this and other reasons, it was obviously impossible to assess each consumer with a proportionate charge for distribution; and therefore the mains and services must, for purposes of argument, be taken as an extension and a part of the storeage. Mr. Gemuender did not approve of the charge for meter-rent, saying that it was contrary to the legislation of the country; and he recommended instead a "service-charge" covering the cost of office and collecting expenses, maintenance of service-pipe, &c. He argued that these were entirely independent of the quantity of gas used; that they could be easily estimated for each customer, and therefore should be a matter of separate charge; but that the cost of meter maintenance bore a close relationship to the quantity of gas measured, and might therefore be included with the general cost of gas. Where a large meter was required with a small annual consumption of gas, he thought that the difference in cost, as compared with that of a meter sufficient to measure the actual consumption, should be a matter of a special charge to the consumer; or that in such cases the consumer should find his own meter. Roughly speaking, the "service charge" would average about 1s. per consumer per month; and this in the aggregate would represent a considerable increase of income to companies encumbered with a large number of small customers. The question of considerably cheaper rates for day consumption was then dealt with; the writer arguing that such could not be justified unless it could be shown that the special discount was unavoidable in order to secure the same. The day business certainly involved no increase of capital; and therefore this class of consumption might be allowed a discount equivalent to the interest on capital. It was shown that this item would not exceed about 4d. per 1000 cubic feet; and any reduction in excess of this amount, was a favour granted to the day at the expense of the night consumer. Further, certain classes of the latter kind of consumption might reasonably claim to participate in the lower terms. A company should aim at reaching permanent conditions, leaving aside such acts as afforded a temporary advantage at the sacrifice of principle, or which could be characterized as unjust.

Mr. Padan opened the discussion by remarking that the paper read as beautifully as the Golden Rule; and he thought it would be as hard to execute in practice. The sentiments expressed in it might be adopted where there was no local competition. Mr. Faben agreed that there should be a more direct proportion between the actual service rendered and the price charged. Theoretically, the arguments were sound; but it would take a

* See *ante*, p. 577.

lifetime to educate a community to the accepting of them. In his case, the only reason why he was not a convert to a rigidly enforced uniform rate was because he did not find such to be advisable at present. It was quite correct that the law did not countenance a charge for rent of meter, though in some cases the local authorities were empowered to fix a maximum for that item. With regard to a concession to large consumers, in his case they took 65 per cent. of the total consumption, and rendered it possible to supply the small customers at a moderate figure. In many other towns also, he thought it could be shown that, after a liberal discount to the large consumer, the small consumers were supplied with gas at a cheaper rate than would be possible if they received an independent supply. Mr. Graeff supported the principles that were laid down in the paper; and he considered that, whether practical or not, the time was come when gas consumers should be taught to understand them. He agreed with the uniform price, but not exactly with the uniform service charge. Something of the sort should certainly be levied upon consumers of a trifling amount. Under present circumstances, it certainly was advisable to offer gas at low rates for fuel and power; and he considered the proposition in the matter of large meters and small gas bills to be quite impracticable. The term "service charge" was certainly preferable to "meter rent," which conveyed a wrong impression. Mr. Chollar argued that the large consumers were the backbone of the business; and that allowances could be made to them without injuring the small customers. Mr. M'Millin thought there must be a charge for meter-rent or some equivalent to it; and that the law would not forbid it in the case of a consumer of a very small quantity of gas, at any rate. A man might have a meter and service-pipe laid on, not intending to use gas regularly, but merely as a reserve in case of the failure of the electric light. He quite agreed that the business should be run on definite rules, and quoted several examples from his own practice. Mr. Hayward contended that it was not possible to work on rigid rules; but that the policy generally exercised in getting and retaining business of all kinds must be followed —particularly under the pressure of competition. Stoves and gas-engines could not be introduced without cheaper rates. Mr. Humphreys argued that it was not right to reject the principles laid down in the paper as unpractical. It would not hurt the meeting to consider theoretical matters; and if they turned out to be right and just, then they must be taken as a standard to be worked to as nearly as popular prejudice would allow. He questioned whether the cost of maintenance of meters bore any recognizable proportion to the quantity of gas used. In any case, the repair and control of the meter should be retained by the seller. It would be a very difficult matter to arrive at a uniform service charge; and he did not agree with the argument that day gas should be sold at but little if any lower rates than the ordinary consumption. Mr. Starr said the object of a meter-rent was to get payment for the meters that were not in regular use, rather than for those that were. He did not consider it practicable to figure out to such minute proportions as those in the paper; he believed in charging a fair price sufficient to cover incidentals. Mr. Allen could not see the difference between gas and any other business; and any commercial house that adopted a one-priced system would certainly fail. He believed in discounts to large customers, and in being guided by local circumstances. Mr. Gemuender, in replying, did not insist that meter-rents were illegal, but only that there was a feeling against them. He had assumed it as granted that all should be treated alike, and had merely endeavoured to arrive at some practical unit.

A paper on "The Testing of Ammoniacal Liquor" was read by Mr. G. Osius, of Detroit, who pointed out that the "Twaddell" was only an approximate in the case of crude, and quite inapplicable to concentrated ammoniacal liquor. He described the "distillation" and the "saturation" tests, the preparation of standard acid, &c.; and said that each 4 oz. strength represented 1 per cent. of ammonia in the liquor. In connection with the paper the following from the question box were considered: "What should be the strength of a liquor in order that a pound of it should yield a pound of sulphate?" "Can liquor above 8 oz. strength be safely stored in cemented tanks?"; "What is the strongest liquor that can be shipped without danger of crystallization?" In the course of a conversational discussion, it was stated, in answer to the first question, that a liquor conforming to those conditions would be 100 oz. strength; as regards the second, that liquor did not act on cement; and in reply to the third, that any concentrated liquor containing carbonates was liable to deposit them

The next paper was read by Mr. C. H. Marden, of Coshocton (Ohio), and was entitled, "How to put a Small Gas-Works on a Paying Basis." Referring to the difficulties encountered in re-establishing a concern that had been badly managed, he said they were much greater than those incurred in starting a new undertaking. After instancing the multifarious nature of the duties to be discharged by the manager of a small gas-works, he insisted on the importance of supplying good pure gas, at the lowest remunerative price.

Mr. Clapp heartily supported the recommendations in the paper; and Mr. Starr, in following on the same lines, said there was one thing omitted, and that was to give away plenty of big burners. When gas consumers get a bright light, they will not object to their bills. Mr. Cantine said that the most economical burner for coal gas was one using about 9 cubic feet per hour. Mr. Taylor advocated more energy in pushing the sale of gas in small districts, especially in the way of day consumption. He quite agreed as to giving away large burners, and also using them in the public lamps. He did not mind giving more gas in these than was paid for, as it was a good advertisement; and he never had complaints about bad gas. Mr. Nash said the one important essential was to put the apparatus in good shape. A small gas plant with old apparatus would not pay.

Mr. H. Padan, of Portsmouth, Ohio, read a paper on "The Relation between Increase of Output and Decrease in Cost of Manufacture and Distribution," which he characterized as an important feature in all lines of business. Formerly, the only object of increasing business was to secure a corresponding ratio of profit; but now, in many cases, the only way of keeping a business alive at all was to increase it, so as to admit of introducing economies in production that were not possible on the smaller scale. The question had been carried so far as to lead to the formation of gigantic corporations, that attracted the attention of legislators; and corporate monopoly seemed to be in harmony with the genius of American legislation, which afforded protection to home industry, and which meant, when analyzed further, protection to the margin of profits as well as to labour. In some businesses, the extent of operations was simply circumscribed by the amount of capital at command; but in the gas industry this did not apply, as the demand in the district supplied governed the size of the works. Yet it was a fact that, in the gas business, the smaller the scale of operations the larger was the proportion between capital and revenue; and this was the more marked because the capital, under the most favourable circumstances, would be three times as great as the annual revenue, whereas in some businesses the yearly turnover was many times greater than the capital employed. It was this that was mainly instrumental in bringing about the low prices of gas to-day, which were about half those of 20 years ago. Having illustrated this point at some length, the writer proceeded to consider the effect of the proportion between minimum and maximum output, as regards the cost of making gas; and also the difference of a large, as compared with a small works. Taking a million cubic feet per day as the standard, he thought that a 500,000 cubic feet production would add 10 per cent. to the selling price; a 100,000 feet make, 25 per cent.; a 50,000 feet, 50 per cent.; and a 25,000 feet, 100 per cent.

Mr. Gemuender expressed a strong dissent from the assertion that "corporate monopoly seemed to be in harmony with the genius of American legislation." He also asked for further information as to how the figures quoted at the end of the paper were arrived at. Mr. Printz said that he was now selling 50 per cent. more gas than was the case eight years ago, with practically the same staff at the works and in the office. Mr. Thompson claimed that there were other things to be considered, in addition to the proportion between capital and labour, in comparing the cost of gas 20 years ago with that at the present time. Great improvements had been made in apparatus, enabling better returns to be obtained from the materials used. Twenty years ago little or nothing could be got from the tar; the ammonia went to waste; and the price of coke was much less than it was now. At the same time, the increased output was perhaps the chief factor concerned in securing the desirable result. He agreed that a certain amount of emulation prevailed in a large works, that was not found in a small one.

(To be continued.)

Ipswich Scientific Society.—A very successful *conversazione* was held by the above-named Society on Wednesday evening last, inthe Town Hall, Ipswich. The Mayor (Mr. D. Ford Goddard), as a Past-President of the Society, being desirous of showing his continued active sympathy with its objects during his mayoralty, regarded the visitors as his guests for the evening; and, in conjunction with the President (Mr. E. P. Ridley), he personally received them on their arrival. Apart from the interest attaching to the gathering from the association with it of Mr. Goddard, it was noteworthy for the excellent collection of gas and electric appliances shown by Mr. Edwin C. Sayer. They included one of Suggate's "radio-photometers," the object of which is to record lights of varying intensity in terms of the standard candle. It consists principally of vanes of a light material, accurately balanced on a spindle revolving on crystal points, which, by the well-known laws of absorption and repulsion, revolve with greater or less speed according to the intensity of the light to be measured. The revolutions having been ascertained, the illuminating power is read off direct by reference to a table. It is used by the Ipswich Sanitary Authority to test the gas supplied by the Gas Company, and is highly valued as affording a more expeditious and much easier method of calculating illuminating power than the standard photometer. Mr. Sayer also showed one of Sugg's illuminating power meters; Mr. Vernon Harcourt's aërorthometer; various kinds of photometers; one of Brownhill's gas-meters; a cheap gas-engine of his own construction; the Lux gas-balance; and a small electric arc lamp, with reflector, given to him in 1867 by Lord Rayleigh. The *conversazione* was one of the best the Society has ever held; and at its close a hearty vote of thanks was accorded to the Mayor.

REGISTER OF PATENTS.

Charging and Drawing Retorts.—Ruscoe, J., of Hyde. No. 8479; May 16, 1891.

This invention relates to further improvements in apparatus for actuating or working the moveable division-plate for charging inclined gas-retorts described in Trewby's patent No. 19,256 of 1889; though it may also be applied to operate an ordinary charging-scoop or drawing-rake in inclined retorts. Instead of actuating the apparatus as described in Ruscoe's patent No. 14,720 of 1890 by means of gearing, it is now proposed to move the several parts as required by direct-acting rams or pistons actuated by fluid pressure, with the object of lessening the number of working parts by doing away with wheels and gearing.

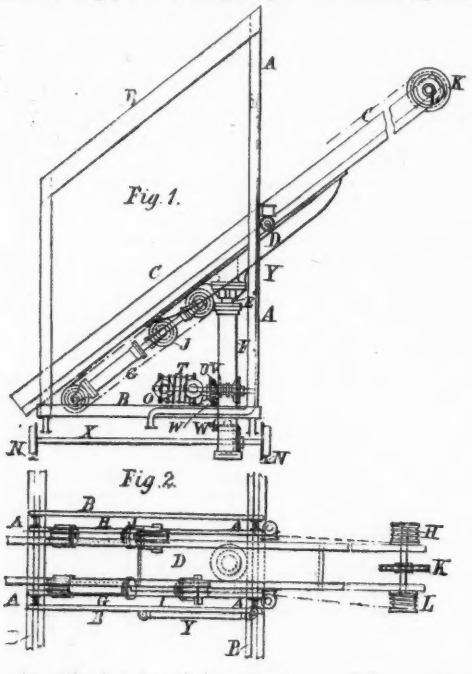


Fig. 1 is a side elevation of the apparatus; and fig. 2 a plan of the division-plate frame.

The framework is (as described in the former patent) preferably built up of upright beams or girders A and transverse beams or girders B. The division-plate is similar to that shown in the former patents; and so it is not again given in these drawings. It is mounted in a similar way upon the vertically moving frame C. To the frame is connected a table or plate D, capable of sustaining its entire weight; and to the table is attached a ram or plunger E of a hydraulic cylinder F, securely bolted to the framework. To the division-plate frame, there are also attached two hydraulic cylinders G and H with rams I and J, which actuate the division-plate, and draw it into and out of the retorts as required. These hydraulic cylinders are fixed side by side directly under the longitudinal members of the division-plate frame at the bottom end between uprights; and they are constructed with sheaves or pulleys at the ends, arranged in the same way as in hydraulic cranes. The chain by which the division-plate is raised and lowered is led round the pulley K, carried on a shaft at the upper end of the frame. On the shaft are two chain drums L M, by which it is rotated. Chains pass round the pulleys of the hydraulic cylinder and ram G and I, to the chain drum L; and from the pulleys of the cylinder and ram H and J, to the chain drum M. The chains are wound on to the drums in opposite directions; so that, when the ram I is in the act of unwinding its chain from the drum L, the chain from the other ram J is being wound upon the drum M, and the ram pulled back into the cylinder H.

The travelling gear for traversing the retort-house on the rails N, comprises two more hydraulic cylinders O P, and rams R S, affixed to the lower members of the structure, with chains therefrom passing round a drum T. These chains are also wound in opposite directions round the drum; so that, by alternately forcing out one ram and then the other, a reciprocating rotary motion is given to the drum. On the shaft which carries the drum T are two loose bevel-wheels U with a clutch V between, which slides on a key. The bevel-wheels U gear with a bevel-wheel W; and by alternately moving the clutch V to gear with one wheel or the other, as the motion of the drum T and shaft is reversed, a continuous movement in one direction is obtained for the gear-wheels W W¹, which latter drive the main axle X whereon the wheels are carried that rest and run upon the rails. Each machine is preferably fitted with an upright pipe Y, or other chamber, to which the several parts can be connected by flexible pipes.

Regulating the Passage of Water from Mains to Service-Pipes.—Tylor, J. J., of Newgate Street, London. No. 8649; May 20, 1891.

It is well known, remarks the patentee, that in some cases (more especially abroad, and for comparatively small supplies of water) meters are not used because of their expense; but that, instead thereof, a sealed tap is used intermediate between the service-tap, or ball-tap, and the water-main, for the purposes of limiting the supply of water to a customer to a certain maximum quantity in a given time—proportionate to the amount paid by him. According to the present invention, it is proposed to employ an apparatus of peculiar construction, which may be either screwed direct into the water-main and have the service-pipe connected thereto, or be so arranged that it can be inserted into any suitable part of the service-pipe.

The apparatus is constructed as follows: A body or casing of gun-metal is provided, having a perforated stem adapted to screw into a hole tapped in the water-main, or to be connected to a pipe coming therefrom. Above the stem, the body or casing is widened out into a conical chamber, which has a branch formed thereon adapted to have secured thereto one end of the service-pipe, the service-tap, or the ball-tap, as the case may be. The lower end of the conical chamber is formed into a valve-seat round the passage leading from the bottom of the conical chamber through the stem. The upper part of this passage is tapped to receive the lower screwed end of the stem of a valve, adapted to close as nearly water-tight as possible against the valve-seat. The upper end of the valve-stem is continued up through a cap screwed on to the top of the body or case; and it is furnished with means by which it can be turned from outside the casing. The part of the spindle which passes through the cap is screwed; and the hole in the cap through which it passes is tapped to correspond. Into the conical chamber is fitted a hollow conical plug provided with radial holes of various sizes at the level of the branch leading to the service-pipe or other outlet. This conical plug is provided at the top with notches, or other means, by which it can be turned, by a suitable tool, into any desired position in the conical chamber.

Assuming now, for example, that the apparatus has been screwed into the main, that the service-pipe has been connected to the branch, that the valve is shut so as to prevent water passing from the main into the service-pipe, and that it is desired to adjust the apparatus so that not more than a certain quantity of water can pass to the consumer in a given time—the cap is first unscrewed and removed; and the valve still remains closed against its seat by the lower end of its stem being screwed into the passage leading to the main. A proper tool can then be introduced; and the hollow conical plug turned to bring that opening in it which is of suitable size to pass the required quantity of water, opposite the service-branch. When that is done, the cap is screwed on again; and the valve is opened by turning its spindle so that its screw threads will cause it to rise free of the passage leading from the main, and to close with its upper surface against the underside of the cap, so as to prevent leakage of water past the screw-thread on the spindle where it passes through the cap. Water can then flow to the service-pipe, but only in quantity dependent upon the size of the hole made in the conical plug that has been brought exactly opposite the service-branch.

Should it be desired to alter the quantity that is to be allowed to pass in a given time, the valve is first closed, then the cap is removed, and the position of the hollow plug altered so as to bring the radial hole in it which is suited to allow the particular quantity of water to pass, opposite the service-branch. The cap is then replaced, and the valve re-opened. If it is desired to shut off the supply of water entirely from any particular service, without interfering in any way whatever withthe adjustment limiting the quantity supplied, it is only necessary to close the valve.

The proper position in which the hollow plug should be placed, to allow of the passage of a certain quantity of water, may be indicated by figures marked on the plug, and a point marked on the body or case to which one of such figures must be brought in order to bring the hole of the required size into position.

Setting and Heating Gas-Retorts.—Boult, A. J.; communicated from A. Klönne, of Dortmund, Germany, and F. Bredel, of Milwaukee, U.S.A. No. 9310; June 2, 1891.

This invention consists of (1) An improved method of charging the fuel in the generator or fire-box from one side of the bench, and doing the clinkering from the opposite side. (2) An improved method of supporting retorts which are set at an angle to the horizontal line.

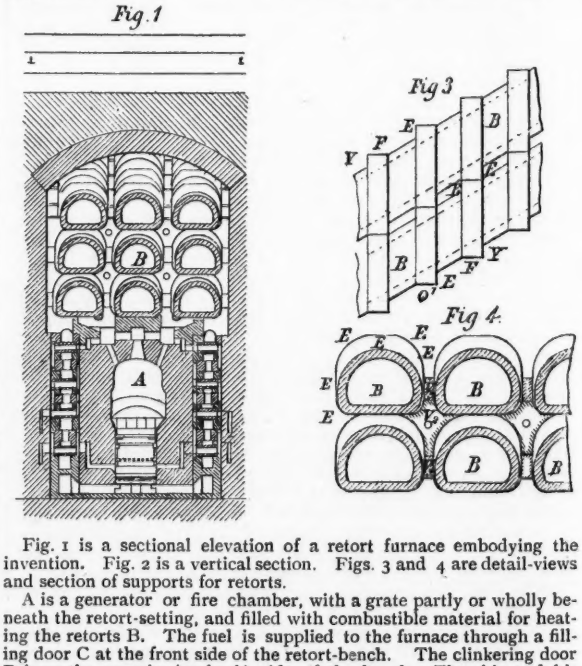
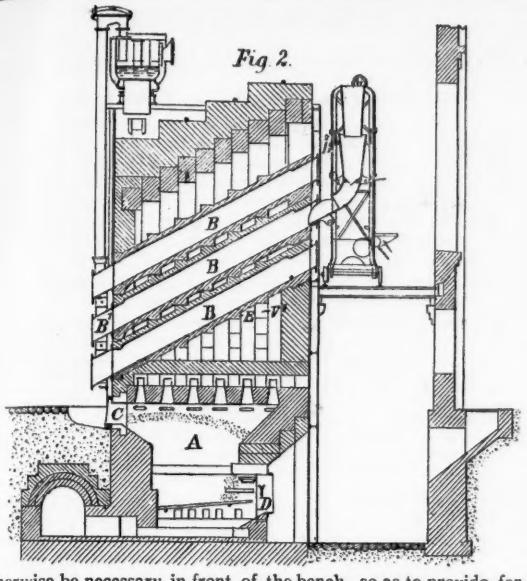


Fig. 1 is a sectional elevation of a retort furnace embodying the invention. Fig. 2 is a vertical section. Figs. 3 and 4 are detail-views and section of supports for retorts.

A is a generator or fire chamber, with a grate partly or wholly beneath the retort-setting, and filled with combustible material for heating the retorts B. The fuel is supplied to the furnace through a filling door C at the front side of the retort-bench. The clinkering door D is on the opposite (or back) side of the bench. The object of this improvement is to do away with excavation or an elevated stage or floor on the discharging or front side of the retort-bench, which would



otherwise be necessary in front of the bench, so as to provide for the clinkering and stoking of the fire and discharging of the retorts.

E and V^1 show an "improved" way of supporting inclined retorts as detailed in figs. 3 and 4. It has been customary, say the patentees, in setting inclined retorts, to support them on blocks, piers, tiles, or other suitable structures of refractory material, shaped to correspond with the angle of inclination of the retorts. This has not provided a substantial support, as the weight of the retorts will tend to drive the supporting walls out of their vertical position, and thereby give the retort a tendency to sag or bend downward. To obviate this, the retort, wherever it is supported by piers V^1 and V^2 on both sides exposed to the heat of the fire, is constructed with a circumferential ring or offset E, made in one piece with, and forming part of the retort B, and having a horizontal supporting surface when the retort is in its inclined position; thereby giving a substantial support, and preventing all sliding tendency and side pressure against the supports. A general idea of the supports as arranged between retorts is shown in fig. 4 by V^2 and V^3.

Charging Inclined Gas-Retorts.—Gibbons, B. and W. P., of Lower Gornal, Staffs. No. 9366; June 3, 1891.

This invention refers to apparatus for charging inclined through gas-retorts; the charging mouthpiece being at the upper end of each retort.

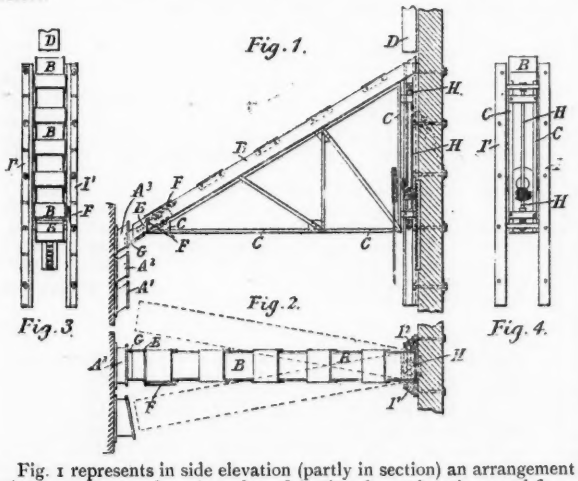


Fig. 1 represents in side elevation (partly in section) an arrangement of the apparatus; fig. 2 is a plan; fig. 3 is a front elevation; and fig. 4 is a back elevation.

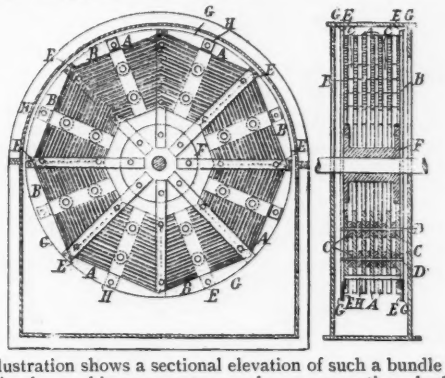
The patentees propose to provide beyond the charging mouths A^1 A^2 A^3 of the retorts an inclined coal-shoot or coal-trough B, by preference parallel, of about the same cross sectional area as the retort to be charged, and of about the same length. The inclination of this shoot to the horizontal is the same as the inclination of the retorts—that is, preferably a little steeper than the angle of rest of the coal or slack with which the retorts are to be charged; say, from 30° to 33°. The shoot is carried by a framework C, which can be moved so as to bring the lower end of the shoot opposite the mouth of any retort in one bed or group, or in one tier in the different beds or groups. The upper end of the shoot is adapted to receive coal from an ordinary overhead hopper, or other source of supply, the bottom of which is shown at D, and the lower end is provided with a hinged or other gate E, which can be opened by the lever F, and also has a moveable lip or tongue G, which can be moved to-and-fro, and inserted into the mouthpiece of the retort, or withdrawn therefrom.

When it is desired to charge any one of the retorts, the lid on the mouthpiece is opened, and the shoot or trough is moved so as to face the open mouthpiece into which the lip or tongue G is inserted. The bottom end of the shoot is closed by its gate E; and the gate or lid on the hopper D is opened, and the coal moves down into the shoot, and gradually fills it with the required charge. The outlet of the hopper is now closed, so as to prevent any more coal passing out into the trough; and then the gate E at the lower end is opened, and the charge moves down into the retort. If the trough and the retorts are set at the proper angle, the charge of coal moves down into the retort *en masse;* and a regular stratum of coal in the retort is the result.

The upper end of the shoot, or the frame supporting it, may be pivoted to allow of the trough being turned rapidly, so that its lower end will correspond with either of the retorts in one tier in the same bed; and the trough may be also provided with means for vertical adjustment, so that it can be raised or lowered to reach either of the tiers of retorts. This is shown in figs. 1, 2, 3, and 4, where it will be seen that the frame C carrying the trough B is pivoted so as to turn about an upright shaft H, which, at its upper and lower ends, is carried by cross pieces, which can be moved up and down in upright guides I^1 I^2 fixed to the wall opposite the bed of the retorts. As shown by the dotted lines in fig. 2, the trough can be turned about the shaft H, so that its lower end will correspond with the outer retorts in the bed or group. The vertical adjustment of the shoot or trough is thus obtained by the worm fixed on the shaft H, and gearing with the rack fixed to the wall; this worm and the shaft being turned by the bevel-wheels, and wheel worked by an endless rope or chain from below. The faces or the mouthpieces of the outer row of retorts in each bed may be made slightly bevelled as shown in fig. 2, in order to more conveniently reach them by means of the trough B and the lip or tongue G.

Washing or Scrubbing Gas.—Chandler, J. C., of Brixton Road, London. No. 10,918; June 26, 1891.

This invention relates to gas washers or scrubbers of the kind described in patent No. 7691 of 1888, in which the wetted surfaces against which the gas impinges are composed of bundles of laths. Instead of employing laths, it is proposed to use boards having therein a number of saw-cuts or slits for affording a large amount of wetted surface. A number of such boards would be made up into a bundle; suitable distance-pieces being placed between them.



The illustration shows a sectional elevation of such a bundle held in position in the washing apparatus; and a cross section—both when applied to a horizontal washer, such as is described in patent No. 422 of 1877.

A are the boards; B, the slits or saw-cuts therein; C, the distance-pieces between the boards; and D, bolts passing through the boards and through the distance-pieces and serving to clamp the whole together. A series of these segmentally-shaped bundles are formed into discs, which are caused to revolve in order to retain the surfaces properly wetted, in the usual well-known manner. As shown, several bundles are clamped between pairs of arms E to form a disc; the arms being secured at their inner ends to a hub or boss F, and at their outer ends connected by plates G. H are cross-bars bolted between the plates G on opposite sides of the bundles, in order to retain the bundles in their proper positions between the arms.

Heating the Charge in Gas-Engines.—Edwards, E.; communicated from G. Petit and E. Blanc, of Voiron, France. No. 260; Jan. 6, 1892.

This invention relates to apparatus for heating uniformly and to a sufficient degree, a mixture of air and gas or inflammable vapour, in order to form a readily explosive mixture in gas-engines or other apparatus of the like kind.

Supposing the apparatus is applied to an ordinary gas-engine having a piston working in a cylinder the outer end of which forms a combustion chamber, it is proposed to arrange in this chamber a smaller chamber of cast iron or other suitable material, provided with a number of partitions (the number and size of which may be varied as found desirable) round which the explosive mixture circulates. The inner chamber is made to project for a considerable distance behind the combustion chamber; and it is surrounded by another chamber or casing through which the exploded mixture is made to pass and circulate after having actuated the piston. An exhaust-valve, operated in the usual manner, is arranged between the combustion chamber and the chamber last described. In this way the explosive mixture before, entering the combustion chamber, and while passing round the several partitions in the inner chamber, is highly heated by the burning mixture round that part of the latter chamber which enters the combustion chamber, as well as by the passage of the burnt mixture surrounding the end of the inner chamber, which projects outside the combustion chamber, as such burnt mixture passes to the exhaust-pipe; and in this way it is claimed that efficiency and economy are attained.

Manufacture of Gas.—Wilson, G. M. S., Toronto, Canada. No. 535 Jan. 11, 1892.

This invention relates to apparatus for manufacturing gas, of the variety in which hydrocarbon oil is vaporized and combined with steam or water and air for the production of the gas.

In the manufacture of such gas, says the patentee, one of the main difficulties encountered is the perfect decomposition of the vapour so as to convert it wholly into a fixed gas. Usually it occurs in apparatus designed for this purpose that a large percentage of the oil escapes in one form or another with the waste product, leaving in many instances only a comparatively small percentage actually converted into gas. The present invention is designed to make this larger product available by reason of the arrangement and construction of the retorts, the method of heating them, and the combination which is formed with steam and air in the retorts.

The retorts employed consist of five several pipes or tubes, and an inside return pipe within the central upper tube. The three upper tubes occupy the full width of the inside of the furnace, set substantially against one another along their contiguous sides and against the walls at each side, so as to furnish a bed for a fire to be built upon them, especially for heating the retorts upon their upper sides, and serving at the same time to heat a boiler. The commingled oil, air, and steam are forced into these retorts by steam pressure. Air likewise is admitted under valve control; and oil under suitable control is also admitted—both the air and the oil making their entrance in front of the jet of steam, so as to be carried by the force of the jet forward into the respective tubes. The steam will, of course, contribute to the atomization and vaporization of the oil, immediately on coming in contact therewith; and the oil, steam, and air issue together into the tubes through perforated or other suitably-constructed nozzles, which serve to break up and spray the oil, air, and steam, or the vapour of the oil, as it may be admixed with the air and steam at this point. This admixture is now in condition to be converted into a fixed gas by a proper decomposition in the retort tubes, which are heated to a sufficient degree to produce this result. Exposure to the requisite degree of heat and a considerable distance of travel of the gas are required to make the decomposition complete. Hence the gas travels zig-zag through all the tubes, and thence to the washer. In this way, such perfect exposure of the gas to the heat of the furnace is obtained, and for such length of time is the gas detained within the retorts as to practically decompose all the hydrocarbon vapour, and convert it, with the air and steam, into a fixed gas which is exceptionally clean and free from condensation.

Gas-Pressure Governors or Regulators.—Altmann, A., of Berlin. No. 719; Jan. 13, 1892.

This invention relates to gas governors or regulators which act automatically to ensure uniform pressure of the gas passing therefrom notwithstanding fluctuations in the pressure of gas in the mains. The use of mercury is dispensed with; glycerine or thin machine oil being employed instead.

Fig. 1.

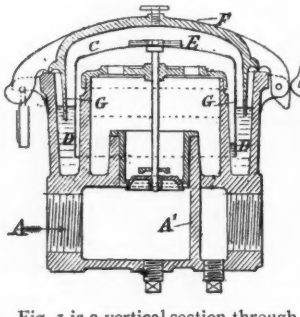


Fig. 2.

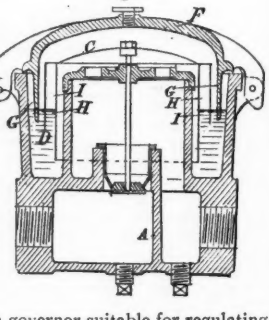


Fig. 1 is a vertical section through a governor suitable for regulating the pressure of gas intended for illuminating purposes; and fig. 2 is a section of one intended for regulating the pressure in a gas motor.

The gas enters from the gas-main at A and leaves the governor at B (at the other side of a partition A^1) after it has been reduced to the desired pressure. The reducing-valve and the bell C fixed on the valve-spindle, balance the gas pressure in the interior of the governor in the usual manner. The bell dips at D into water, glycerine, or thin machine oil, to prevent the escape of gas to the exterior. By loading the bell with weights E, the pressure of the gas passing out can be increased or diminished at will. The cover F of the governor in fig. 1 has a ring G of such length as to dip into the liquid which seals the bell, and which thus forms a hydraulic joint. The air enclosed between the cover and the bell cannot escape in any other way than through an opening in the cover, formed by a screw which has a wedge-shaped recess. By increasing or diminishing the area of the opening by raising or depressing the screw, a cushioning action can be obtained which influences the speed of lift of the bell.

While the braking action for the lift of the bell in the arrangement of governor used for illuminating plant is sufficient for a good governing action, the employment of the governor with gas motors (as fig. 2) necessitates a brake which shall also act against the descent of the bell. For this purpose, the following arrangement is provided: The case or body of the bell C is made with double walls H and I, forming an annular space which is closed at the top by the bell, and at the bottom by the sealing liquid. At a suitable place within this space, there is provided a small air-pipe, which extends upward nearly to the roof of the bell and downward through the bottom wall of the governor. By this means, communication is effected between the inner annular space and the outer atmosphere. In the case of an increased consumption of gas—as, for example, when the engine piston is making its suction stroke—the bell has a tendency to descend, so that the air in the annular space is compressed and can only escape through the pipe. The duration of the downward movement of the bell is thus dependent solely on the quicker or slower escape of air; and by contracting the outflow area of the pipe, the speed of descent of the bell can be reduced as desired.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

The Cost of Enriching Gas by Carburetting.

Sir,—In reply to the letter published in your last week's issue from an anonymous correspondent "Black Coal"—

1st. Most of your readers know for themselves that cannel giving 12,000 cubic feet of 30 sperm candle gas cannot be bought at less than 42s. per ton, delivered at works in England.

2nd. The coke from cannel of this quality is not only useless in itself, but when burnt with "black coal," does injury to the bulk. Other residuals I did not take into account.

3rd. Evidence of an independent and *trustworthy* character can be obtained from engineers using this process.

4th. There would not be any difficulty in testing 100 sperm candle gas with most photometers, if a suitable burner could be discovered; but, as a matter of fact, the candle power is worked out by dividing the total value in sperm candles by the increase in bulk.

5th. In enriching coal gas up to 18 sperm candles, *no* spirit (not oil) is condensed back into the mains; and no loss in illuminating power takes place in storing this gas in holders, or in distributing to consumers.

6th. By no means.

I am afraid that this process has not been sufficiently studied by your correspondent, or my paper would not be considered useless even by him.

May 7, 1892. Frank W. Clark.

Sir,—Mr. Clark in his paper (see Journal, p. 751) shows that by the use of 93 tons of coal yielding 10,000 cubic feet of 15·25-candle power gas, mixed with 7 tons of cannel yielding 12,000 cubic feet of 30-candle power gas, he obtains 10,140 cubic feet of 16·28-candle power gas. That this is not so theoretically, is plain by working it out fully.

Theoretically, if you have a coal and a cannel as above, and desire to make a gas of 16·25-candle power (an increase of 1-candle power over that given by the coal), you must use them in the proportion of 94⅞ tons coal and 5⅛ cannel; but the make of gas per ton (to be exact) is 10,114·285 cubic feet.

If, at the initial stage, Mr. Clark bases his calculations on its being necessary to use 7 tons of cannel in lieu of 5⅛ tons, or about 22½ per cent. in excess of the quantity required, it is evident the deductions need revision.

May 4, 1891. Bristol.

The Present Position of the Gas-Works Rating Question.

Sir,—With all deference to Mr. Newbigging, I submit that my interpretation of the intention of the law, in relation to gas-works, is neither inaccurate nor likely to lead to confusion. It will be obvious that, in using the term "rent," I do so in a popular sense, as representing the sum which a lessee would actually pay, and from which the deductions mentioned by Mr. Newbigging are invariably excluded. It would be difficult to express in one sentence the meaning of the term "rent" as applied to gas-works in a legal sense; nor would it be any use to do so, because scarcely any two authorities are agreed on the subject. So long as the law admits of one gas consumer being charged 1d., and another 4d., towards the rates, it seems to me that any attempt at a strict definition of the numerous fictitious terms that have been imported into the subject is simply like straining at a gnat while swallowing a camel.

I venture to think that my remarks, so far from complicating the question, will simplify it, by showing the impossibility of dealing satisfactorily with a gas undertaking that is *worked*, as a house that is *occupied*, and the urgent necessity for some better enactment than the present law, which admits of the valuation ranging from one-third up to the whole of the actual profits.

Salisbury, May 6, 1892. N. H. Humphrys.

Bolton Corporation Gas Department.—At the quarterly meeting of the Bolton Town Council, last Wednesday, Alderman Miles, the Chairman of the Gas Committee, submitted the annual statement of the working of the department. He said that for a few years back they had been enabled to considerably reduce the capital account by doing certain work out of current revenue; but this year they had placed various items of expenditure, amounting to £13,043, to this account. They were, notwithstanding, able to depreciate the account still further by the sum of £5000 transferred from the reserve fund, which left the capital account in a still more favourable position compared with the previous year. The revenue had not been so satisfactory as could be desired; but the increase in the consumption of gas had been gratifying; being 34,625,000 cubic feet, or about 5½ per cent. on the year, and representing an increase of £4600. The gross profit on the year's working was £47,127, as against £53,756 in the preceding year; and after providing for the requisite standing charges, they had left £16,351, which the Committee recommended to be transferred to the relief of the district rate. This amount was equal to about 3 per cent. on the capital. The quality of the gas averaged 17·91 candles. One of the most satisfactory items in the balance-sheet was the unaccounted-for gas, which had been brought down to the low figure of 3·47 per cent. The Committee were engaged in still further extending the system of generative firing in a new stack of 288 retorts. With regard to the prepayment system for gas, they had something like 130 meters on the penny-in-the-slot principle. Active work was being pursued in view of the proposed electric light installation. An amendment was proposed that £10,000 of the surplus should be devoted to reducing the rates, and the remainder to capital account, but it was negatived.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Bills read the first time: Blackburn Corporation Bill; Brynmawr and Abertillery Gas and Water Bill; Electric Lighting Orders Confirmation Bill (No. 4), to confirm Orders relating to Dublin, Fareham, Liverpool, Oxford, Sheffield, and Waterford; Electric Lighting Orders Confirmation Bill (No. 5), to confirm Orders relating to the County of London (part of), Southwark, and Wandsworth; Electric Lighting Orders Confirmation Bill (No. 6), to confirm Orders relating to Hampstead, Lambeth, Shoreditch, and Whitechapel; Gas Orders Confirmation Bill (Bideford, Glastonbury and Street, Prestatyn, and Willenhall Gas); London County Council (Subways) Bill; Mold Water Bill; Ormskirk Gas Bill; Rhyl Improvement Bill; Southend Gas Bill; Stamford and St. Martin's Stamford Baron Gas Bill; Water Companies (Regulation of Powers) Bill; Water Orders Confirmation Bill (Ross and Sevenoaks Water).

Bills read a second time and committed: Airdrie and Coatbridge Water Bill; East Grinstead Gas and Water Bill.

Bill referred to a Select Committee, consisting of Lord Hamilton of Dalzell (Chairman), Earl Yarborough, Lord North, Lord Dunally, and Lord Seaton; to meet on Tuesday, May 10: Uttoxeter Water Bill.

Bills read the third time and passed: Ashton-under-Lyne, Stalybridge, and Dukinfield District (Water) Bill; Glasgow Corporation Bill; Ipswich Corporation Bill; Pontypridd Water Bill; Swansea Corporation Water Bill; Swinton and Pendlebury Local Board Bill; Western Valleys (Mon.) Water (Gas Purchase) Bill.

HOUSE OF COMMONS.

The following progress was made with Bills last week:—

Bills read the first time: Ashton-under-Lyne, Stalybridge, and Dukinfield District Water Bill; Glasgow Corporation Water Bill; Ipswich Corporation Bill; Pontypridd Water Bill; Swansea Corporation Water Bill; Swinton and Pendlebury Local Board Bill; Western Valleys (Mon.) Water (Gas Purchase) Bill.

Bills read a second time and committed: Electric Lighting Provisional Orders Bills (Nos. 1, 2, and 3).

Bills reported: Barrow-in-Furness Corporation Water Bill; Liverpool United Gas Bill; Oxford Gas Bill; Southborough Local Board Gas Bill.

Bills read the third time and passed: Bristol Gas Bill; Mold Water Bill; Rhyl Improvement Bill; Stamford and St. Martin's Stamford Baron Gas Bill.

HOUSE OF COMMONS COMMITTEE.

Tuesday, April 5.

(*Before Mr.* CAMPBELL-BANNERMAN, *Chairman; Sir* W. HOULDSWORTH, *Sir* H. STAFFORD NORTHCOTE, *Mr.* R. K. CAUSTON, *Mr.* S. GEDGE, *Mr.* P. STANHOPE, *Mr.* POWELL WILLIAMS, *Mr.* W. JAMES, *and Mr.* E. H. LLEWELLYN.)

BIRMINGHAM CORPORATION WATER BILL.

To-day the cross-examination of Mr. *Mansergh* was continued.

Mr. PEMBER questioned witness with regard to the table put in giving the consumption and probable daily demand for water; pointing out that it began in 1891 with 15½ million gallons, and went up in 1955 to 67 millions. He said he supposed that this was for the parliamentary district of Birmingham. Witness replied that it was; and he said that when he spoke of 76 million gallons, he referred to the whole district of supply between Birmingham and the Elan. But the 67 millions were part of a table relating also to the income derivable from Birmingham. Asked if Birmingham was not considered to have a sort of copyright in the area proposed to be taken, because it had been proposed by Sir R. Rawlinson, although it was brought before the Duke of Richmond's Commission by Mr. Fulton as a watershed for London, witness said this had been suggested.

A plan was then put in by Mr. Pember showing the scheme of Mr. Fulton. The Chairman, upon inspecting it, observed that the Elan and Claerwen were only part of the ground then proposed to be taken. There were to be four reservoirs; and three of them were lower than that which received the waters of these two rivers.

In cross-examination by Mr. JOHNSTON EDWARDS, for the Birmingham opposition, witness said he did not think it a dangerous thing for a town to depend entirely on one source of water supply. There was nothing about the construction of the works which would render them susceptible to accident. Besides, they were going to provide locally an additional storeage of 200 million gallons; and this would provide against any emergency. A suggestion had been made that there might be a large joint scheme for Birmingham and other cities; but there were objections to this. Besides, the present scheme was large enough to stand alone. There were many objections to the proposed double-service system. It was intended by it to take into the houses only water from the sandstone wells. The present supply could only be increased sufficiently to provide for the growth of the population during six or seven years. It was clear that this did not justify the duplication of mains, services, and reservoirs, and the putting of the town to enormous trouble and annoyance. The double service had not been adopted in many towns in England.

Mr. BALFOUR BROWNE (in re-examination): Would any mutilation of the scheme be a very serious matter for Birmingham?

Witness: It would ruin the scheme.

Supposing the Committee should say, "You may have the Elan, but you must wait for the Claerwen," would that be a very serious matter for Birmingham?—Frightful. You see, we shall want the Claerwen in about 19 years. Under these circumstances, we might have to make our aqueduct too large, because the space for the third pipe might have to remain useless, and £100,000 would be wasted. Besides, we have not allowed for enough storeage on the other river alone to deal with all its water. The scheme, in fact, would be so seriously injured as to be practically useless.

Professor *Lapworth*, examined by Mr. BALFOUR BROWNE, said he had examined the present sources of water supply of Birmingham from the sandstone formations of the neighbourhood, with special reference to their capacity and suitability for the service of the city and district for a lengthened period. He had also visited all the principal wells of the locality. It would appear at first sight that the city, which was situated only a short distance to the west of the central line of a great trough of water-bearing rock, was in an excellent position for obtaining an abundant and permanent supply from wells and borings sunk in the strata of the district. But, unfortunately, three out of the six great sheets of strata forming this trough were locally valueless as water-bearing rocks; and consequently only three formations were available—viz., the pebble beds, the variegated sandstones, and the Keuper sandstone rocks, or waterstones. All three were well known to be more or less permeable and water bearing; and the water they afforded, which was that of the actual Corporation wells, if it existed in sufficient abundance, would be adequate in quantity to supplying the wants of the city. The area occupied by the outcrop of these water-bearing rocks was about 35 square miles; but about 5 square miles was under the control of the South Staffordshire Water Company. The proportion of the collective area of 35 square miles which was covered by the pebble beds was about 18 miles; that of the variegated sandstone, 9 miles; and that of the Keuper sandstone, 8 miles. Three of the Corporation wells—viz., those of King's Vale, Witton, and Perry—were sunk in the pebble beds and conglomerates, In the area covered by the variegated sandstones, there were two wells—viz., those of Aston and Selly Oak. Longbridge was the only deep well belonging to the Water Department which was sunk in the rocks of the water-stones. This was a new well; and the works were at present incomplete. A boring near the Edgbaston reservoir in April, 1868, was carried down through 76 feet of glacial clays and gravels, into the usual red sandstone and clays of the variegated sandstones, to a depth of 272 feet. Hardly any water was met with from top to bottom of the boring. A boring near Harborne was made in the pebble-bed area. The strata pierced were sandstone rocks and marls; and the boring was carried to a depth of 311 feet. It was a failure as regards water supply, as the largest quantity obtained was only about 35 gallons per minute. The Birmingham Water Committee pumped from the water-bearing rocks of the neighbourhood, when all their completed wells were in full and simultaneous operation, the following quantities per day: King's Vale, 380,000 gallons; Witton, 2,000,000 gallons; Perry, 1,600,000 gallons; Aston, 3,000,000 gallons; Selly Oak, 880,000 gallons—total, 7,860,000 gallons. If to these was added the proved yield of the unfinished Longbridge well—viz., 600,000 gallons—there was produced a total daily yield of 8,460,000 gallons, or, in round numbers, 8,500,000 gallons. In addition to the water drawn from these rocks, a large quantity was pumped from the same water-bearing strata within and around Birmingham by owners of various public and private wells and manufactories, &c. The average quantity of water pumped daily from the 35 square miles of water-bearing rocks within the limits of control of the Corporation Water Committee might be estimated at 12 million gallons. The average annual rainfall for the whole neighbourhood was, in round numbers, about 30 inches. The usual amount of percolation theoretically allowed for sandstone rocks was 10 inches per annum (answering to 400,000 gallons per day per square mile). At this rate, the total supply from the 35 square miles of water-bearing rock in and around Birmingham would be 14 million gallons daily. But of the 35 square miles, some 7½ lie within a radius of two miles of the centre of the city, and must be deducted from the future water-yielding area at the service of the Corporation, for the following reasons: (1) This area is insufficient for the present supply of the local baths, breweries, manufactories, &c., within the city. (2) The actual supply can be but small, and will grow smaller, owing to the extension of paving, drainage, and sewage courses. (3) The water must be already more or less contaminated by the presence of a large population; and this contamination will increase. In this way, therefore, the total deep water-bearing area became reduced from 35 to 27½ square miles; and the estimate of a permanent and available yield from ordinary percolation into the water-bearing rocks sank from 14 to about 11 million gallons. It might be felt that, as Birmingham already possessed a proved supply of 8½ million gallons from this restricted area, and that this supply was furnished by a few wells, some at no great distance from each other, therefore, if additional wells were sunk at fresh and more scattered spots, the present supply would be increased in proportion. This anticipation, fortunately, was tested by information already at command. The trial bore-holes demonstrated that, outside the river valleys, the quantity of water percolating into the Birmingham sandstones was comparatively small—so small, indeed, as to be practically valueless. He was, therefore, distinctly of opinion that by no possible increase in the number of wells within the 27½ miles of water-bearing sandstone at their command to the north, west, and south of the city, would the Corporation be able to add more than about 2½ or 3 million gallons to their present supply, and keep the water at the same time free from surface contamination.

Mr. *Copley*, F.R.S., F.G.S., Assoc.M.Inst.C.E., a Past-President of the Geologists' Association, gave corroborative evidence; adding that the sites chosen for the reservoirs in the Elan and Claerwen valley were such as to afford firm foundations for embankments, and were in every other respect excellent.

Professor *Boyd Dawkins*, F.R.S., Assoc.M.Inst.C.E., expressed himself as agreeing absolutely with what Professor Lapworth had said as to the draught on the existing wells having very nearly reached the quantity of water they were capable of supplying. Indeed, he would not like to pin himself to the opinion that there was even the slightest marginal possibility of increase of which that witness had spoken. It

seemed to him that some of the existing wells drew from the surface water; and he did not think there was within 20 miles of Birmingham any area available for the supply of well water.

Mr. BALFOUR BROWNE said he would call Professor Green also, if the Committee thought it desirable that he should do so.

The CHAIRMAN: The Committee have observed that there has been no cross-examination on this evidence. I do not know whether any evidence is to be offered on the other side.

Mr. DYSON: Oh, we have evidence.

Mr. BALFOUR BROWNE: Very well, then; I will avail myself of the weight of Professor Green's name.

Dr. *A. H. Green*, Professor of Geology to the University of Oxford, said that he was in perfect accord with the conclusions arrived at by Professor Lapworth.

Dr. *E. Frankland*, F.R.S., said he was formerly a member of the Royal Commission appointed to inquire into the pollution of rivers and the domestic water supply of the country. He received from Dr. Bostock Hill monthly the results of an analysis of Birmingham water, in the blended form in which it was supplied to the inhabitants. These results showed the water to vary a good deal in quality from time to time, and to be polluted with organic elements. The hardness of the water during the past four years had also largely increased. It varied between 12° and 17·5° in 1888, and between 17·5° and 25·2° in 1891. Thus there had not only been serious fluctuation of late in the quality of the water, but continuous deterioration. He had taken samples of the Elan and Claerwen water both in flood time and in normal weather. The former he had allowed to settle, and had filtered through 3 feet of sand, so as to anticipate the conditions to which it would be exposed in the reservoirs. Both yielded an excellent analysis. They did not contain any ammonia, while nitrogen in the form of nitrates, which would have revealed pollution by manure, was either absent or present only as the merest trace. He knew of no better water for the purpose to which it was to be applied. It was fully equal to the celebrated Loch Katrine water. On the other hand, the samples he had collected of the Birmingham river waters now consumed in the city were very seriously impure. The Blythe contained 35·12 parts in 100,000 of solid matters in solution; the Bourne, 34·4 parts; the Witton stream, 34·88 parts; and Plant's Brook, 33·52 parts. Organic carbon and nitrogen were present in such quantities as to indicate pollution by sewage or manure. Not one of these waters was fit for the supply of Birmingham.

The CHAIRMAN: Would you say that these wells and brooks are worse than sources of water supply usually are in large towns?

Witness: Oh, emphatically. I wish to say that I do not know a large manufacturing town in the United Kingdom so badly supplied with water as Birmingham at the present time.

Wednesday, April 6.

On the resumption of the proceedings this morning,

Mr. MOON intimated that, as representing the Wye Fishery Board, he should not have reason to appear again before the Committee until they had discussed the preamble. The promoters had largely increased the compensation water proposed under the Bill. It was true they had not given the Board as much as, in principle, they thought they were entitled to have; and he did not wish the quantity conceded to be regarded as that which Parliament had allowed them in satisfaction of the rights of the case. In regard to spawning-beds, the Corporation had very properly met them by saying that they were prepared to accept the principle of compensation in money—the amount to be discussed later on.

Dr. *Frankland* was then further examined. He said that, on the whole, it was his opinion that nothing was to be apprehended as to the action of the Birmingham water upon lead, if it had been filtered.

Cross-examined by Mr. EDWARDS: By the time the Welsh water found its way to the Birmingham pipes, it would probably have about 2° of hardness. Professor Dewar and he had made a large number of experiments on the effect of soft water on lead, and had found that filtration was in itself, apart from the hardness it gave, a preventive. He had also passed the water in its natural condition through the Birmingham pipes, and had found that it did not affect them.

Re-examined: There were some very soft waters which did not affect lead at all. In his opinion, this scheme for a new supply of water to Birmingham was not brought forward a moment too soon. On the contrary, he had been surprised that Birmingham should have waited so long. He said this even more especially in view of the quality than of the quantity of the water.

The CHAIRMAN: I understand you to say this water is not, among soft waters, one which, in its natural state, much affects lead.

Witness: I think I should rather say that it stands among those which act considerably, and rather more than the average, upon bright lead, but that its action upon tarnished lead is very slight. All new service-pipes are bright lead; but they acquire the coating of tarnish in two or three months. Water which has this effect on lead at first, loses it after awhile.

At this point Mr. PEMBER, Q.C., interposed to announce another settlement. He said Mr. Lloyd (whose house was to be submerged), had withdrawn his opposition; the Corporation having come to a satisfactory arrangement with him.

Professor *Dewar*, F.R.S., was next called. He said he was formerly a member on the Commission appointed to investigate the lead poisoning at Sheffield. He did not think that, after the ordinary filtration, there would be the slightest fear of any action by the Elan and Claerwen water upon lead. This view was the more certain, because it would have travelled through many miles of cut-and-cover-work. In Glasgow, the water of Loch Katrine, though it acted rather violently upon lead at the lake itself, was used without filtering after passing along the aqueduct, being found then to have little effect upon lead. He agreed that the waters at present consumed in Birmingham were rapidly deteriorating. As to the saving in soap, Mr. Mansergh's estimate of £60,000 was a very small one. Every 1000 gallons of the present Birmingham water required 200 lbs. of soap to soften it completely—*i.e.*, to produce a permanent lather. Taking the population at 460,000 only, and the quantity of water used per head per day for the purpose of washing and personal cleansing at half a gallon only, he found that 46,200 lbs. of soap were used daily to soften it. At 1d. per pound, which was much less than the cost, this would amount to £192 per day; whereas with the Welsh water the cost would be £10 per day. It would be seen, therefore, that £60,000 per annum, as the amount of the saving, was a ridiculously low figure. From his experience of water-works, he thought the present scheme would be an immense boon to the population of Birmingham, as regarded economy, cleanliness, and health, and especially to the poor and to manufacturers.

Mr. *J. W. Gray*, M.Inst.C.E., the Engineer to the Corporation, said that his connection with the Water Department had lasted for 26 years, during which time he had designed and carried out all the works connected with the water supply. In several reports he had made to his Committee during the last few years, he had drawn attention to the fact that, as the demand for water increased, the additional supply would have to come from the present river sources, and therefore the quality of the water would be deteriorated as time went on. This had turned out to be the case; and complaints of bad water had increased. In 1888 there were 43; in 1889, 56; in 1890, 145; and in 1891, 279. This state of affairs caused him great anxiety. From what he had observed in the last few years, he believed the chief cause of the deterioration to be the water of the Blythe. All the water was raised by steam power; and the cost of the water in pumping alone, exclusive of the interest on the cost of works, was a very heavy annual charge on the Department, and had necessitated a large expenditure on capital account. He estimated, owing to the adoption of the water-closet system in Birmingham (the number, in 1886 only 7614, was now 27,620), and to the great addition of baths to houses of from £25 per annum upwards, that the average demand in 1900 would be 4½ million gallons per day in excess of the yield; and the maximum 9½ millions. This would mean a water famine. Consumption for trade purposes and street watering would have to be curtailed, in order that the domestic demand should obtain a part of its needs. Indeed, as the case at present stood, before works of any magnitude could be constructed, the Department would be compelled, unless Birmingham was to go short of water, to adopt measures to secure a further supply, either by extending drifts or tunnels from the present wells, or by sinking another well, which might tide over the difficulty for perhaps two or three years. But he was of opinion that one or two more wells would completely exhaust the water to be obtained from the sandstone formation within the district; and these might diminish the supply procured from the present wells. It had been suggested that two systems of supply might be adopted—one of well water for drinking purposes, and another of surface water for other uses. This would not be the means of reducing the supply per head of the population; and therefore more water would still be required. This scheme would necessitate the construction of special reservoirs, the laying of two lines of pipes, the erection of duplicate engine power for the whole district, the opening up of all the streets, and in each house the provision of additional lead pipes, taps, and cisterns. There were no natural sites on any of the streams in the neighbourhood of Birmingham where large storeage reservoirs were capable of being constructed; and therefore fresh sources of supply would still have to be found, as in the present case. He agreed with the evidence given by Mr. Mansergh and Sir Thomas Martineau. He would be very sorry for Birmingham during the next five years if he could not find more water; and as regarded ten years ahead, Birmingham people must assist the Department as far as they could, by being careful, for he was perfectly certain that the supply would have to be curtailed.

The CHAIRMAN: You heard the evidence of the geologists. Does that accord with your general impression and experience of the neighbourhood—that no new sources can be found underground?

Witness: That is so. I may find one that may give me 1½ million gallons a day; but, in fact, I believe some of the water we get now is what has sunk into the sandstone from streams.

Mr. BALFOUR BROWNE: Taken as a whole, do you think that is practically the only scheme for Birmingham?

Witness: Not only that, but it is the best scheme possible.

What is your view of the dual system?—Well, nobody would care to wash clothes in dirty water, or to use it for baths. They would merely flush water-closets with it; and the water-closets of Birmingham would not use 2 million gallons a day. What was this against the expense of a duplicate system? Besides, there were a large number of trades who would require the clean, and reject the dirty water.

Cross-examined by Mr. FREEMAN: In a report which he presented to his Committee in 1891, he said that additional reservoirs might be erected on the Bourne, and good water obtained from that stream. The reservoirs he spoke of were to contain 1131 million gallons, and were to supply what was required for 20 years to come; but that was assuming Parliament would grant the Corporation the whole of the waters from that side. Since Birmingham was last in Parliament, however, it had become customary to give compensation water; and though Birmingham did not give any at present, it was probable that, if they approached Parliament in the matter, they would have to do so. He did not think 20 years was the period commonly looked forward to. No doubt it would be, for a small country place; but for a city like Birmingham, increasing by leaps and bounds, 50 years was not at all too long. As to the dual system, it would be dangerous to have two taps in a house, lest people should drink water drawn from the wrong one.

In answer to Mr. STANHOPE, witness said he had no doubt that some of the objections which had been made to the Birmingham well water were good also in regard to the South Staffordshire well water. Therefore the small towns between Birmingham and Wolverhampton would be glad of the alternative supply which Birmingham would be able to offer them. As a matter of fact, he believed they were asking Parliament for special terms.

In re-examination, witness said the Bourne scheme would have cost a million sterling. Having considered Mr. Mansergh's scheme alongside it, he had at once approved of that scheme, especially as the Committee had desired him to say whether or not temporary provision could be made for 25 years; and he had found it could not.

The inquiry was adjourned till the following day.

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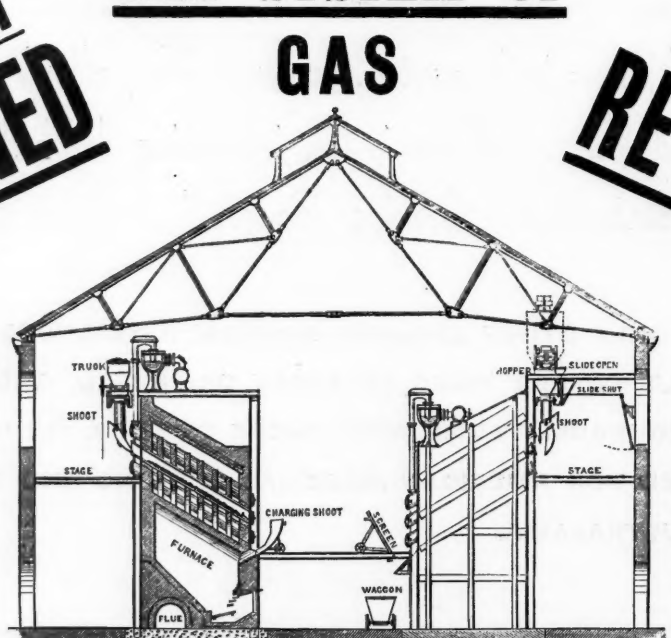

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LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Tuesday, May 3.

(*Before Mr. Justice* KEKEWICH.)

Gadd v. Mayor, &c., of Manchester—The Gasholder Guiding Patents.

The hearing of this action, which involves the validity of Mr. Gadd's patent for the construction of gasholders without guide-framing, was resumed this morning. The previous proceedings are reported on pp. 628, 668.

Mr. *Edward Lloyd Pease* said he was Managing-Director of Ashmore, Benson, Pease, and Co., Limited, of Stockton-on-Tees. The firm were large manufacturers of gasholders. In the beginning of 1889, his Company first came into communication with the Manchester Corporation, with regard to constructing a gasholder. He had previously obtained a patent for improvements in gasholders—the provisional specification being dated Dec. 14, 1888; and the final, Sept. 13, 1889. The original contract with the Manchester Corporation was in May, 1889, and there was a supplemental contract on July 19. He produced the original drawings, which were in accordance with his own patent. The diameter of the holder was 100 feet. On May 24, 1889, he wrote to the Gas Committee suggesting that the new holder should be guided on the wire-rope system, which would enable a saving of £500 to be effected on the one holder. While this matter was under the consideration of the Committee, he sent a model to Manchester; and it was shown in the Secretary's office at the Town Hall. It was not a public exhibition; that was at the end of May, 1889. Two or three members of the Gas Committee were there that day; and the model was put in operation. Some further correspondence ensued, and the work, so far as it applied to his invention, commenced in July—before the date of the supplemental contract. Further drawings were made in connection with this contract, under witness's superintendence, including the descriptive notes. The special fittings for the ropes were sent from the factory in November, 1889; and shortly afterwards the ropes themselves. The gasholder was completed and used at the end of December, 1889. It was in accordance with the supplemental contract and working drawings, with the exception that the whole of the rope used was of the same section, whereas in the working drawings some was of larger section. During all this time, he had no knowledge of Mr. Gadd's patent now sued upon—but only of his spiral guide patent. His Company had erected other gasholders on the same principle—one at Haslingden, near Manchester, the contract for which was taken in July, 1889, and it was finished in September.

Cross-examined: He had taken an interest in gasholder construction since about the year 1885. He first heard of Malam's patent last year; and Wild's at the same time. The same with regard to Standfield's. His firm had been manufacturing gasholders for many years. There were no models of holders which had been constructed; but there were, of course, the working drawings. He did not examine those drawings before making his own. Prior to Mr. Gadd's patent of 1887, he was not acquainted with any method of guiding gasholders without guide-framing. He knew of the 1887 patent when working out his own invention. He read the JOURNAL OF GAS LIGHTING, but not regularly; and he did not remember an article referred to in August, 1888, alluding to Gadd's 1887 patent. In his patent, the wire ropes did not perform two offices—one to guide, the other to control. The provisional specification said the invention related to "guiding and controlling." The part of his invention which guided the holder up and down was the rope arrangement and nothing else. The rope controlled the holder by preventing it moving out of a horizontal position. He called the ropes check-ropes. The effect of them was that when one part rose, every other part rose also. The apparatus could be used with guide-framing, as well as without, if desired. That did not necessarily refer to adding a new lift to an old gasholder; but if he were putting up a new holder, he should not use external guide-frames.

Mr. WARMINGTON, Q.C., said that closed the defendants' case. He did not propose, in addressing his Lordship, to travel over the same ground which Sir Horace Davey had covered in opening, but mainly to bring out those points which his friend could not bring into strong relief until the evidence had been given. He would consider first, Mr. James Terrace's invention, as to which the evidence was quite plain, that Mr. Terrace, working quite independently of Mr. Gadd, had arrived at the same conclusion. Then the question was whether there had been any publication of this invention. There were he believed nine persons to whom it was communicated; and, of course, the suggestion on the other side was that in each case the communication was of such a confidential character as to make it not a publication in a legal sense. He submitted that the real question was, whether the person to whom the communication was made stood in such a relation to the inventor as to take him out of the category of one of the public. In several cases, there had been no attempt to place the seal of confidence on the communication; and even in the case of Mr. George Livesey, which he did not consider the strongest case, the suggestion that the matter should be kept private seemed to have come from Mr. Livesey himself. In one instance, the communication was said to have been made "as a mere matter of news." On the whole, he submitted there had been prior publication; and on this point he referred to the case of *Blank v. Footman* (5 Patent Cases, 653.), which was a case where the registration of a design was nullified because samples had been shown to several persons, and orders obtained, before registration. Learned Counsel then proceeded to make a few observations on the question of non-conformity or disconformity between plaintiffs' provisional and complete specification. All previous patents, whether they were anticipations or not, must be taken to be common knowledge, and were of importance in showing what part of the problem remained uncovered in dealing with the stability of a gasholder. The purpose here aimed at had been in view for many years; and therefore an inventor was not entitled to claim the benefit of the doctrine of mechanical equivalents. He could only claim protection for a particular method of achieving a well-known and desired result. The Court always wished to protect the rights of an inventor; and to ensure him the reward of his exertions. But, on the other hand, it had to protect the rights of the public, and not allow their freedom of action, as the result of prior knowledge, to be interfered with. Mr. Gadd, in his evidence, said that the peculiar character of his invention was guiding a gasholder by means of gearing at the base, in such a manner that every point should be raised together; and that it included any known device for this purpose. Dr. Hopkinson's evidence was to the same effect; it admitted that an engineer reading the provisional specification would not be led to make the arrangements shown in the complete specification. Mr. Davy's evidence was much to the same effect; it showed they were trying to introduce into a patent of this kind that which could not be introduced into it, and to include in the patent all possible means of obtaining the same result. On the other side, Sir Frederick Bramwell's evidence was that the invention described in the complete specification was quite distinct from that shown in the provisional; and there was nothing to show that the patentee had even in his mind at the time this so-called tensional mode of carrying out his object. He did not propose to deal at length with the alleged anticipations, which had been commented on by Sir Horace Davey; but there was one point with regard to Malam and the Grantham holder to which he wished to draw attention in connection with one passage in the complete specification of the plaintiffs, which said that the wheels might be arranged either radially or tangentially, or at any angle desired. That passage seemed to be directly anticipated by Malam. On the whole, he submitted that the defendants had made out their case. The anticipations, alleged served a double purpose—first, to show what was the state of public knowledge, and how narrow was the field left for invention; and secondly, as direct anticipations of what the plaintiffs had claimed in their complete specification.

Justice KEKEWICH said one question occurred to him on which much evidence had not been given—what was the meaning of the term "floating structure," which occurred in Standfield's specification? He should probably hear from the Attorney-General that the term could not be applied to a gasholder.

Mr. WARMINGTON said, on this point, Sir Frederick Bramwell's evidence was distinct, that a gasholder was a floating structure.

The case was then adjourned.

Wednesday, May 4.

The ATTORNEY-GENERAL, replying upon the whole case, said there were three important issues raised—the first being whether or not there was a prior publication of a part of Mr. Gadd's invention by what he would call the Terrace incident. This would be fatal to the plaintiffs' case, unless it could be shown that the publication, whatever it was, was not such as ought to anticipate Mr. Gadd's patent. The second question was whether or not there was good subject-matter, having regard to Malam's and other anticipations. The third question would be whether or not there was such want of conformity between the complete and the provisional specifications as to invalidate the patent. The second issue involved the consideration of the question whether or not the problem was the same when dealing with a pontoon (taking this as a type) and with an inverted vessel like a gasholder. In reference to the first question—whether the Terrace incident invalidated the plaintiffs' patent—it was proved beyond all question, and not disputed by the defendants, that Mr. Gadd never had any notice of what Mr. Terrace had done until the morning of the 13th of December, when he received Mr. Terrace's letter with the one design in it which was undoubtedly identical with that which Mr. Gadd had previously sent in. It was not disputed that this design was in Mr. Gadd's original specification written out two or three days before. No doubt Mr. Terrace had also thought of it contemporaneously, and had shown it to somebody seven or eight days before. In *Newball v. Elliott*, which related to a machine for paying out a cable, a trial of the apparatus had taken place on a ship in the presence of the crew and a considerable number of other persons; but the Court found, as a fact, that it could not be tried experimentally in any other way, and that because it was an experimental trial it did not anticipate the invention. In Mr. Hindmarsh's book on patents, the proposition was stated very clearly that whenever it appeared that an act done before the date of the patent was not intended to be a publication of the invention, it would not be presumed to have amounted to a publication, unless it was clearly shown that the effect of the act was to publish to the world a knowledge of the invention. It could not be denied that the question was identically the same upon the point as to whether Mr. Gadd or Mr. Terrace was the original patentee. The first thing to be observed on this point was that it was clear Mr. Terrace did not at the time mean to prevent himself from taking out a patent. Of course, he might have done it as a matter of fact.

Justice KEKEWICH remarked that he did not think the Attorney-General need trouble himself about that.

The ATTORNEY-GENERAL said this being so, the next point to be discussed was: Had it the effect of preventing Mr. Terrace from taking out a patent? With reference to the list of names which had been mentioned by Mr. Warmington, it was to be observed that in every single case there was either a misunderstanding—that was to say, a dealing with the matter on such terms that the parties understood that they were being consulted confidentially—or they were in fact being so consulted. Mr. Livesey considered that he was being consulted by Mr. Terrace with reference to a possible invention; and he wrote back saying that he thought the thing ought to be patented. Therefore it could not be suggested that either the receiver or the sender considered there was any publication to the world. The learned Counsel then referred to the evidence and correspondence between the brothers Terrace and various gentlemen whom they consulted with reference to their invention, and submitted that the communications were made with a desire to obtain their opinion, and not with the intention of communicating the matter in question to the general public. This being so, the first branch of the proposition to which Mr. Hindmarsh referred must be answered in plaintiffs' favour. Next, the

second part of the proposition must also be answered in Mr. Gadd's favour, because the communications did not have the effect of publishing Mr. Terrace's invention. The only effect resulting from the communication was that persons were asked their opinion as to the merit of an invention which Mr. J. B. Terrace proposed to patent. Supposing his Lordship was satisfied, in all the cases in which it had been proved, by people who knew of it, either that they were being consulted in such a way that they were aware the thing was being confidentially communicated to them, or that they knew it was intended to be patented, and their opinion was being asked upon it, could it be said that, taking the propositions laid down by the Master of the Rolls (*Plumpton v. Malcolmson*) as to the test of whether it had become part of common knowledge, as a fact it had so become? Then there was the question whether Mr. Terrace did in fact publish his invention. Unless his Lordship came to the conclusion that, before the 11th of December, 1888, one or other of the individuals with whom Mr. Terrace consulted would have been justified in making a machine of his own, on the ground that Mr. James Terrace had not communicated the thing to him in such a way that he was merely asking his opinion upon the invention, but was telling him what he meant to use, the answer must be in the plaintiffs' favour. There was no case in which, where the publication was not intended by the man who published it to be communicated to the public, it had even been found to invalidate a subsequent patent. Dealing with the second point—as to whether or not there was good subject-matter having regard to Malam's and other anticipations—it must be remembered that the only evidence for the defendants was given by two gentlemen of great ability and experience, who were simply called in as experts to advise against the validity of the patent. The defendants had not ventured to put into the box a single person of experience in gas engineering, or in the making of gasholders, to indicate that the plaintiffs' invention was obvious, that it was common knowledge, or that it was a mere application of well-known mechanical principles. Sir F. Bramwell admitted that he had not had any practical experience in constructing gasholders, and had never, except in a single instance, designed one; and that he appeared in the case as a scientific witness, and nothing else. Although the defendants had called Mr. George Livesey, whose position was a unique one in the gas world, as their witness, they did not put to him a single question with regard to the arrangement by Mr. Terrace or Mr. Pease—that was to say, the two modifications which Mr. Gadd said he had invented and developed—being an application of common knowledge. Seeing that the anticipations relied upon in the defence were from thirty to sixty years old, and that they had never had the slightest relation to gas engineering, to the construction of gasholders, or of a single vessel coming into the same category, he (the Attorney-General) submitted that it not only did not form part of the stock of common knowledge in relation to gasholders, but that no person other than a scientific witness in a patent case could have seriously suggested that the anticipations were to be regarded as things to be compared with the alleged invention. With the exception of Staindrop and Malam, the whole of the alleged anticipations, and the models illustrating them, had been made, for the purpose of the present case, from the specifications; and it was justifiable to say that, unless people could be found who had been directed to the problem, and the solution of the problem, in those earlier specifications, they ought not to be treated as anticipations. The alleged anticipations, apart from Malam and Staindrop, were in connection with pontoons, or a similar kind of structure; and the elements of the problem were admitted by Sir F. Bramwell to be different when dealing with a pontoon to what they were when dealing with a gasholder. The learned Counsel then dealt at length with the evidence on this point, and proceeded to argue that a vessel analogous to a gasholder—viz., a pontoon—never rose out of its guides; but whether it did so or not, the guides were not dispensed with. Every single anticipation prior to this arrangement, except Mr. Gadd's own—that was to say, the spiral—was in connection with a machine which always had guides that operated on the side, right up to the top of it; and it never left those guides. The great merit of this invention was that, while there was a regulated vertical motion without any screw or sideway motion round the axes, the guides and guide-columns, which were a great source of expense, involving repairs, &c., could be dispensed with. As to Wild's patent, though it was some 37 years old, not only was there no proof of its ever having been made, but there was not the slightest evidence of its ever having been applied to anything but a pontoon. The first observation to be made with reference to Malam was sufficient to dispose of it as an anticipation—viz., that, as described in the specification, it would not dispense with side posts at all. Sir Frederick Bramwell admitted that both Malam and Staindrop intended to use side posts. In concluding his observations, on the second point, the Attorney-General submitted that there was ample subject-matter in Messrs. Gadd and Mason's patent, and that not one of the anticipations, which had been searched out with extreme ingenuity, prevented it from being good subject-matter. With regard to the third point—the alleged disconformity between the provisional and complete specifications—there was only one case in which a patent had been upset for this reason. It was admitted that, if the language of the plaintiffs' provisional specification did not fairly include the subsequent development, the complete specification could not be read, and ought not to be read, so as to include what had subsequently been put into it. But it was not correct to say that Mr. Gadd must have had in his mind what might be called the particular device which appeared in his complete specification, and which came within the language used. The case stood thus—that, in fact, Mr. Gadd had invented his arrangement before December, 1888, and did not steal it, or take it from anybody else, and insert it in his complete specification. He had sworn that he never saw anywhere a description of what he put into his complete specification; but the whole of it was the result of his own thought and development. The learned Counsel then referred to the case of *Woodward v. Sansum*, and contended that the plaintiffs' complete specification was less outside the letterpress of the provisional specification than it was in that case, where the Court of Appeal decided against the defendant's contention of disconformity. Without fear of adverse criticism, he (the Attorney-General) would say that the invention in the present case was most unquestionably the vertical raising of the gasholder, so that all parts must be equally raised and lowered alike; and this was absolutely new. The torsional raising had been Mr. Gadd's own invention. The vertical raising and lowering of the holder, so that all parts were equally raised and lowered alike without torsion, was absolutely new; and this was done without guides and weights, and was applicable to the top, the middle, or the lower lift, or to any number of lifts, of the holder. The Attorney-General then dealt at considerable length with the evidence given with reference to the alleged disconformity between the provisional and complete specifications. He said it was most important to remember that it was not suggested by Mr. Pease on behalf of the defendants, that they did anything more than the plaintiffs did. The circular motion had disappeared; and everybody agreed that it was not a material difference. Vertical motion without twisting round was the same—the amount of give-and-take of the one being replaced by corresponding take-or-give, as the case might be, of the other; and this by a gasholder which dispensed altogether with outside posts, weights, or anything of the kind. There was not a single thing done by the defendants that was not done by Mr. Gadd.

Justice KEKEWICH remarked that he did not think this was seriously in question.

The ATTORNEY-GENERAL said the whole question was: Had Mr. Gadd, by the terms of his provisional specification, prevented himself from performing his duty—not his right only—of describing other mechanical equivalents? He took his stand very boldly upon this ground, even if there was nothing in the provisional specification which included pulleys and guide-ropes, as they were simply mechanical equivalents. For the first time, vertical motion in a gasholder without guides, standards, or wheels running against them, applicable to all the lifts of a gasholder, had been described; and if there was nothing in the provisional specification to include this, unless fraud was alleged—unless it were said that Mr. Gadd stole this invention—he would be entitled to stop the infringement complained of. It was true to say that he did describe and did intend to describe, by language which was only applicable to the class of connection they were discussing, chain and link gearing, having the functions which had been proved to be their functions, and which had not been disputed by the witnesses on the other side. Under these circumstances, he (the Attorney-General) submitted that the complete specification was no more than the proper amplification of the provisional specification; and that the former was good, and the patent had been infringed. The learned Counsel then took his Lordship through the plaintiffs' drawing; and he concluded by contending that, applying to the plaintiffs' specification no lenient construction, but the ordinary principles of the duty of the provisional and that of the complete specification, it was a development of the invention which unquestionably had been first thought of by Mr. Gadd. There was no disconformity, and no departure from the fair ambit of the invention; and he submitted that his Lordship's judgment upon this point, as upon the other two, ought to be for the plaintiffs.

His Lordship reserved his judgment.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Monday, May 2.

(*Before Mr. Justice* GRANTHAM *and a Common Jury.*)

Lumley v. New River Company.

This was an action in which the plaintiff, the proprietress of an oyster bar in the Euston Road, claimed damages for injuries and loss sustained by the leakage of water from the defendants' main (laid within a few feet of her shop) into her premises, which had happened, it was alleged, by the defendants' negligence.

Mr. WILLIS, Q.C., and Mr. G. A. VENNELL appeared for the plaintiff Mr. MURPHY, Q.C., and Mr. LYON represented the defendants.

The plaintiff's case, as stated by her in examination, was that she had owned the shop in question for several years, and had been carrying on a fairly good business, when, about two years ago, she found that water was coming into her house from below. She had the boards taken up and there found water to the depth of several inches. After all this had been got rid of, the place was still very damp; and the plaintiff said she had had rheumatic fever, which she attributed to the damp. In addition to the damage to clothes, carpets, bedding, &c., estimated at from £20 to £30, she had been obliged to get a new stove, new boards and papers, and have the rooms whitewashed. The plaintiff said her servant was also taken ill, owing to the damp state of the house, and had to go to the hospital. When the sum of £3 was offered to her for the purpose of getting coals, by someone representing the defendants, she told him that £500 would not compensate her for the loss of health alone, not to mention her damaged house and custom.

Mr. *Saville*, an architect and surveyor, deposed to having taken up the boards in the plaintiff's shop, beneath which he found water several inches deep.

Mr. MURPHY submitted that there was nothing to go to the jury, as there was no evidence that the water came from the main of the New River Company.

His LORDSHIP held that there was no liability unless negligence was shown on the defendants' part; but he declined to stop the case from going to the jury, thinking there was sufficient evidence.

No witnesses were called for the defendants.

Mr. WILLIS, in reply, asked whence came the water they had heard of; and he told the jury that when direct evidence could not be given in a case, they must draw their own inferences. The defendants had suggested that there were underground springs which had caused the damage; but there was no evidence of this.

Mr. MURPHY submitted that the Company had conducted their business in accordance with the obligations and powers imposed and conferred upon them by the 15 & 16 Vict., c. 160; and he denied that plaintiff had proved any negligence, omission, or default on their part.

His LORDSHIP having summed up,

The jury, after a short consultation, found a verdict for the plaintiff for £200.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Guildhall, Friday, May 6.

(*Before Mr. Justice* LAWRANCE.)

Walford and Co. and Others v. Buenos Ayres (New) Gas Company.

This case had its origin in the same proceedings which formed the subject of the action reported in last week's JOURNAL (p. 806). It will be remembered that Messrs. Walford and Co., were jointly interested with Messrs. Pope and Pearson in two cargoes of Silkstone coal—amounting together to 1259 tons—which they shipped to Buenos Ayres on speculation. Negotiations with the defendant Company resulted in a contract being entered into for the purchase of the coal at $5\frac{1}{2}$ paper. Two days afterwards the defendants learned that a mistake had been made in a cablegram, transmitted to them by their Manager, which contained his valuation of the coal, and on which they had based their offer. They immediately telegraphed to Messrs. Pope and Pearson cancelling the contract; and this led to that firm commencing the proceedings to recover £3226, the price of the coal. Before the trial of that action, the coal was put up for sale under an order of the Court. Plaintiffs received an offer of $7 per ton for it; and defendants thereupon said they would give $7 1c. (amounting on the whole quantity of coal to £1812), and at this price a contract was made. After becoming possessed of coal, defendants alleged that it was damaged, and useless for gas making, and deducted 10 per cent. from the contract price; and the present action was brought to recover the full amount.

Mr. BIGHAM, Q.C., and Mr. LECK appeared for the plaintiffs; Mr. BOWYER represented the defendants.

It was contended on behalf of the plaintiffs that the coal was such as was known as Silkstone gas coal; and it was denied that it had deteriorated. For the defendants, it was submitted that there was an implied warranty—it having been described as Silkstone gas coal; and that, although some months ago it might have properly been called gas coal, at the time of the contract it had been damaged by water, and had deteriorated to such an extent that it was not suitable for gas making. Further, defendants had had no opportunity of inspecting the coal, as it was stored at Buenos Ayres, and the contract was made in London.

His LORDSHIP held that this was a sale of a specific article, and that there was no warranty; and he therefore gave judgment for the plaintiffs. [The difference between the sum paid and the amount of the contract was £181 12s. 9d.]

HIGH COURT OF JUSTICE, IRELAND—QUEEN'S BENCH DIVISION.

Thursday, April 28.

(*Before Mr. Justice* GIBSON *and a Special Jury.*)

Gordon v. The Belfast Corporation—Damages for Injuries Caused by and Explosion of Gas.

In this case Mr. Samuel Gordon, a stationer and grocer, of Ballymacarrett, Belfast, sought to recover damages for injuries to his premises and himself caused by an explosion of gas, owing to the alleged negligence of the Corporation of Belfast.

Mr. O'SHAUGHNESSY, Q.C., Mr. CRAIG, Q.C., and Mr. KEIGHTLEY appeared for the plaintiff; Mr. OVEREND, Q.C., Mr. BATES, and Mr. HARRISON for the defendants.

Mr. CRAIG, in opening the case, said that plaintiff carried on a trade in stationery and newspapers, and he was also engaged in the grocery business in a small way. On Dec. 24 last, he noticed a smell of gas in his shop; and he at once communicated with the Corporation. Soon afterwards a person named Watson came from the Corporation; and after he had worked in the shop and at the meter for a considerable time, he entered the kitchen, where the plaintiff and a man named Eagar were sitting, and said the gas was all right then. When plaintiff afterwards went into the shop, Watson asked him for some matches, and went towards a gas-jet close by the meter. Almost at the same moment a person came in to purchase a paper; and plaintiff was going round to supply him as an explosion occurred. The whole shop was thrown into confusion, and the windows were blown out into the street. The plaintiff's house was a corner one; and the gable end was in a place called Young's Row, where there was a gas-main belonging to the Corporation. Within an hour after the explosion, Watson became alive to the actual state of things. He went out, and examined the main in Young's Row; and it was found that it had been broken right through. The subsoil of the street was soft; and the gas percolated through it underneath the foundations of the house. Plaintiff was suffering from varicose veins in one of his legs, and had, in consequence of the explosion, sustained severe injuries; having been four months under medical care.

Mr. *Gordon* was then examined. He stated that his stock had been made unsaleable by the explosion; its value being £165. After the explosion, he was flung on his head and shoulders. He had had the house built at a cost of £400; and he made a profit of £3 a week.

Mr. OVEREND, on behalf of the defendants, said that on Dec. 24 last a message from the plaintiff was received at the gas office to the effect that gas was escaping at his premises. This was reported by one of the clerks to the inspector of mains; and he despatched a competent man to make an examination of the premises, to find the source of escape. They had done everything they thought necessary.

A number of witnesses were called as to the injury to the premises.

James Watson, who was sent to search for the escape, was examined, and said so far as the service-pipe and the connection with the meter were concerned, they were all right. He could tell whether gas was escaping by the smell.

In cross-examination, witness stated that he was a pipe-fitter, and not a gas-fitter.

Mr. *Munce*, Assistant City Surveyor, described the condition of the premises; and said he estimated the damage to the building itself at about £40.

The jury returned a verdict for the plaintiff, and awarded him £300 damages.

SUNDERLAND POLICE COURT.—Friday, May 6.

(*Before Alderman* POTTS, *Chairman, and Messrs.* SANDERSON *and* SIMEY.)

The Liability of Sulphate of Ammonia Stills for Excise Duty.

To-day an action brought by the Inland Revenue against the Sunderland Gas Company, to test the question of their liability for the payment of Excise duty on their stills employed in the manufacture of sulphate of ammonia, came before the Court.

Mr. ALPE appeared for the prosecutors; Mr. EVANS represented the Company.

On the case being called,

Mr. EVANS said he declined to plead, as he took objection at the very outset. The summons was issued against the Sunderland Gas Company, by the Excise authorities at Somerset House, on the information of a Sunderland officer. It was a prosecution under an Act passed in 1846 (9 and 10 Vict., cap. 90), which made it compulsory for a licence to be taken out by any person who kept a still, and imposed a duty of 10s. on the still, and in default a penalty not exceeding £50. He pointed out that the Company were constituted by a private Act of Parliament, and therefore became a body corporate. He held that they were incapable of pleading to a criminal information—that a body corporate, being an artificial person, could neither be indicted nor brought before a criminal court; and supposing the Bench were to make the order to pay the penalty (£50), they could not imprison an artificial person.

Mr. ALPE replied that this question had only recently been settled in a case in which the St. Helen's Tramway Company were concerned; and it had been held that the Company were amenable.

Mr. EVANS: It is quite a different case. The old law holds good that "a company has neither a body to be kicked nor a soul to be saved."

The Bench decided that the case should go on.

Mr. EVANS: Then I decline to plead.

Mr. SIMEY: If you decline to plead, you should decline to appear.

Mr. EVANS: If I appear, I do so under protest.

Mr. ALPE: I must ask that my learned friend plead.

Mr. EVANS, after seeing a note taken of his objection, stated that he appeared under protest, and pleaded "Not guilty."

Mr. ALPE then proceeded to detail the circumstances of the case. He said defendants were charged with keeping a still without a licence on the 19th of February last. The still was kept at their works at Hendon, in the borough of Sunderland, and it was part of their sulphate of ammonia plant. After explaining the Act under which the prosecution was being conducted, he stated that, if the Company had applied to the Inland Revenue, they would have been granted a certificate which would have relieved them from supervision. He urged that the Company, by not taking out the necessary licence, must be regarded as a Company who kept a still without having taken out a licence. It was a plant for the distillation of gas liquor; and it consisted of two stills, one upon the other. These were used for transforming the liquor into sulphate of ammonia, and they could, if convenient, be used for the distillation of alcohol. He would now simply call the evidence.

Mr. *W. H. Young*, Supervisor of the Inland Revenue at Sunderland, gave evidence as to visiting the gas-works, and inspecting the plant, which he fully described, with the object of proving that the Company kept a still.

Mr. *J. Steel*, Superintendent Inspector of the Inland Revenue, London, gave evidence as to examining the plant in question. He said that, in his opinion, it was a still.

Cross-examined by Mr. EVANS: That which a still commonly produced was a liquid. The ultimate production in the present instance was a salt.

Mr. EVANS: Is there anything in the present plant which you can describe as corresponding to the worm of a still?

Witness: No; the actual worm is not there.

Mr. *Lewin*, Senior Analyst at Somerset House, gave evidence as to the definition of a still. He said he had seen the plant at the Hendon Gas-Works, and was decidedly of opinion that it was a still. A still was simply an apparatus to produce a vapour; what the ultimate use of that vapour was, did not change the still. The apparatus was a still, whether the ultimate product was a liquid or a solid.

This closed the case for the prosecution.

Mr. EVANS, for the defence, said that, although he appeared nominally for the Sunderland Gas Company, he in reality represented the Association of Sulphate of Ammonia Manufacturers of Great Britain, who considered that an attempt was being made to foist upon them an unjust tax. The apparatus in dispute had been known for upwards of 30 years; and since that time no attempt whatever had been made to tax it. The officials of Somerset House had evidently, up to quite recently, considered that it did not come within the Inland Revenue Act, which was for the prevention of the manufacture of spirits by unlicensed persons. The Association were determined to resist what they thought to be an idea of the officials at Somerset House to introduce, in an unconstitutional manner, a tax which was never intended by Government to be imposed. If they had wished to put a tax upon an apparatus such as that in question, they should have gone about it in a constitutional manner, and introduced into Parliament a Bill for the purpose, instead of raking up an old Act which was never intended to be applied to cases like the present. In the apparatus at the gas-works, there was no condenser; and the Act clearly pointed out that a still must consist of three parts—a body, a head, and a worm. In the present case there was neither worm nor head. If the officials defined a boiler as a still, then, to carry the thing to its legitimate conclusion, an ordinary kettle was one. The use of a still was to produce a liquid; and in this case the ultimate product was a solid. They could draw no comparison between the two.

Mr. *Ackroyd* stated that he was a Consulting Chemist, and he practised in Halifax. He was the County Analyst, and had had considerable experience in chemistry. In his opinion, taking the apparatus as it stood, it could not be used as a still. It had no worm, and was without several essential parts necessary for distillation.

Cross-examined by Mr. ALPE: It could not be used economically

for the purposes of the distillation of alcohol; but alcohol could be produced by it.

After a short private consultation, the Bench dismissed the case; an application for the costs of the defendants being refused.

It is understood that the decision will be appealed against.

MARYLEBONE COUNTY COURT.—Wednesday, May 4.

(*Before Mr. H. J.* Stonor, *Judge.*)

Bradley v. The Gaslight and Coke Company—An Important Decision under the Employers' Liability Act.

To-day his Honour gave a considered judgment in an important case heard by him at the March Court; the facts being as follows:—

On the 6th of August last, the plaintiff was in the employ of the defendant Company, working in the erection of certain machinery in the retort-house in their works at Kensal Green. He was engaged in pinning up with brick a cast-iron retort, which was held in position temporarily by a wooden strut, part of the Company's plant. This strut was displaced by some bricks falling upon it, and, in consequence, the retort fell on the plaintiff, inflicting serious injuries, in respect of which the action was brought. The plaintiff asserted that the accident happened through the strut being placed against the opposite iron retort instead of against a flat piece of wood, as the other struts were fixed. The defendants denied this, and also that the accident was occasioned in this way. They further alleged that it would have equally happened whether the strut were placed against the iron or the timber. At the conclusion of the plaintiff's case, it was submitted, on behalf of the defendants, that he ought to be non-suited, on the ground that the machinery in question was incomplete, and not then "connected with or used in the business" of the Company within section 1, sub-section 1, of the Employers' Liability Act. His Honour declined to stop the case; and it was arranged that the questions of fact, as to the defect in the condition of the machinery and the damages, should be left to the jury, and that the question of non-suit should be reserved. The jury found in favour of the plaintiff, and assessed the damages at £150. Upon the question of non-suit, the defendants' Counsel relied upon the decision and *dicta* of the Judges of the Divisional Court in the case of *Howe v. Finch* (L.R. 17; Q.B.D. 187), where the defendants were constructing an external wall of a building intended to be used as a warehouse, but which had not been used at the time the accident occurred through the wall falling upon the plaintiff. The Court held that the facts did not show "a defect in the condition of the works connected with or used in the business" of the defendants within the sub-section in question; and Mr. Justice Mathew said "he did not think it was intended to apply to a case where machinery was brought into a place, intended to be used, and left so insecure that it fell"—a *dictum* which very nearly met the present case, but appeared to have been unnecessary to the decision of the matter then before the Court. Mr. Justice Mathew concluded his judgment with the observation that "the damage by the fall of a wall in course of erection cannot be spoken of as arising from defective works actually occupied or actually used for the purpose of business," as to which his Honour observed that the Act does not require that works should be actually occupied or actually used, but only that they should be "connected" with the business of the defendants. Mr. Justice A. L. Smith gave judgment to the same effect; concluding as follows: "'Ways' means the ways used in the business, not partly made ways not used. If that be so as to 'ways,' it is as to 'works.' I do not agree that, if a whole structure fell or caused damage to a workman, he would not have a right of action, for I think he would. But here it was partly finished. I think 'ways, works,' &c., mean the existing and completed works." His Honour said he could not, in the present case, come to this conclusion, although some of these *dicta* certainly appeared to apply; but he thought the case might be distinguished from that of *Howe v. Finch*. The circumstances under which the plaintiff in the latter case was injured scarcely appeared in the report, and might have been very material to the decision arrived at, apart from the construction of the Act. It did not appear in the report whether the defendants were themselves building, or engaged contractors or builders for the purpose, nor whether the building was upon the same premises as those on which the defendants actually carried on business, or upon other premises, nor whether the plaintiff was engaged in the defendants' business, and necessarily passing the wall in question, at the time of the accident. This rendered comparison of that case with the present difficult and unsatisfactory. It was, however, clear that the wall in *Howe v. Finch* was part of a building which not only had not been used, but might never have been used, for the purposes of the defendants' business; while in the present case the machinery the plaintiff was employed in erecting was intended as an addition to machinery actually in use, and was not only intended for the defendants' business, but could not be otherwise employed. His Honour could not see how it could be said that such machinery was not "connected with" the defendants' business. The question as to the completion or use of this machinery appeared to him to have nothing to do with its "connection" with the defendants' business. Under these circumstances, he considered the plaintiff had made out a case to go to the jury, and that he was entitled to judgment under sub-sections 1 and 2 of section 1 of the Act. His Honour concluded as follows: Since preparing this judgment, I have seen the case of *Brannigan v. Robinson* (1892, 1 Q. B., 344), in which Mr. Justice Wright, referring to the case of *Howe v. Finch*, seems to have felt the same difficulty as to the facts of the case which I have, and to have assumed that the building in that case was erected by a builder and not by the defendants themselves, and was in the possession of the builder at the time of the accident; and this, perhaps, was the true ground of that decision. If so, it presents an additional marked distinction between the case of *Howe v. Finch* and the present.

Slough Gas Company.—The ordinary general meeting of this Company was held on the 2nd inst.—Mr. R. Martin in the chair. The profit on the working in the six months endnig Dec. 31 last was £602, which with the balance allowed of the usual dividends.

MISCELLANEOUS NEWS.

THE DANGER TO GAS AND WATER PIPES AND FITTINGS FROM THE PROXIMITY OF ELECTRIC LIGHT WIRES.

Early last month, the Secretary and General Manager of The Gaslight and Coke Company (Mr. J. Orwell Phillips) forwarded to the Board of Trade two reports made to him in reference to the destruction of a gas-meter by electricity in Piccadilly. The matter was promptly investigated by the Electrical Adviser to the Board (Major Cardew, R.E.); and a copy of his report thereon was transmitted to the Company. We have been favoured by Mr. Phillips with a copy of the document; and as the subject dealt with therein is of special interest to owners of gas and water pipes and fittings, we reproduce the principal portions.

Major Cardew opens his report by stating that his attention had been called to the accident to the gas-meter, as well as to two very similar cases of damage to water-pipes, by the Clerk to the St. James's Vestry (Mr. H. Wilkins). It appears that a lead water-pipe, supplying the premises of a Mr. Barker, a pastrycook, whose shop is closely adjacent to the building wherein the meter was destroyed (occupied by Mr. Peat, a saddler), had been eaten through on two occasions within a few months. Major Cardew examined a piece of the damaged pipe; and its appearance suggested electric action. This was supported by the statement of Mr. Barker's employees, who averred that they had sustained electric shocks from touching the handle of a water-tap on a boiler in metallic connection with the lead pipe. As the possibility of electric shocks was a very serious matter, Major Cardew lost no time in having the main of the London Electric Supply Corporation exposed. This main terminates in a dead-end nearly opposite Mr. Barker's shop; and it was thought possible that there might be serious leakage from this. But it turned out to be in very good order; and no shock whatever could be obtained from the outer casing of the main. The action on the water-pipes also was much more likely to be occasioned by a main supplying continuous current. On the 29th of March, Major Cardew examined the gas-meter; and its appearance was thoroughly in accordance with the theory of galvanic or electrolytic action as the cause of the damage. Two holes had been eaten through the back, where it had been in contact with a damp wall; but the rest of the meter did not show any signs of corrosion. On the 30th of March, Major Cardew received an intimation from Mr. Wilkins that Mr. Barker's water-pipe had again failed. The ground was opened to remove the defective pipe, exposing a portion of the culvert of the St. James's and Pall Mall Electric Light Company, which was laid just above the water-pipe; and by means of a few tests with a galvanometer, proof was afforded that there was a steady difference of potential of about 6 volts between the iron culvert and the pipe—the culvert being negatively charged as regards the pipe. This appeared to Major Cardew sufficient to account for the mischief; and he communicated to the Chief Engineer of the Electric Light Company the results of his test, and requested that notice might be given when the culvert was opened, in order that he might be present. He was informed that this would be done on the morning of the 5th ult.; but on account of some very important experiments with the new standard ampère balance, he was unable to make the inspection until the afternoon, by which time the culvert had been partially opened. There was a good deal of water in it, and in some places this had evidently touched the positive main. There were also three lead-covered wires, which had been used as "pilot wires," lying loosely at the bottom. Two of these wires had been fused (evidently by a considerable current), and a good deal of the insulation burnt, as was evidenced by a sooty deposit on the main conductors and the culvert at the spot. This had occurred at two separate places—one being near Mr. Barker's shop, and the other opposite Mr. Peat's. Major Cardew has little doubt that a connection between the negative conductor and the iron of the culvert was effected by the fused and stripped ends of these pilot wires. This is confirmed by the following facts: At the time of his inquiry into the explosions which occurred on the Company's mains, he found that the insulation of the negative side of their system from earth was very defective. This fault was very persistent; but until the culvert was opened it had not been localized and removed. Immediately, however, this section was disconnected, to enable the culvert to be opened, the fault disappeared; and the potential of the positive main from earth, which had been persistently about 190 volts, fell to about 110 volts.

Major Cardew considers the explanation of the action to be this: The negative *main* has for some months been in metallic connection with the culvert in one or perhaps two places in this part of Piccadilly. If the insulation of the positive *side* had been perfect, no electric action would have resulted. But this was not, and in fact practically could not be, the case. Consequently, a leakage current was continually passing to earth from the negative at this place, and an equal current in the aggregate from the positive side through many small leaks. The lines of flow of the current would be to absolute earth or zero potential in all directions. Any water or gas pipes in the vicinity would be practically at zero potential throughout, on account of their metallic connection with the whole mass of the water or gas mains of London. Consequently, the lines of flow of the current would, to a large extent, converge on any such pipes in the immediate vicinity, if only separated from the charged conduit by damp earth. In other words, there would necessarily be a flow of positive electricity from such pipes to the surrounding earth, and thence to the charged culvert. But the flow of positive electricity from a metal into a damp medium, or water, is always necessarily accompanied by the generation of oxygen at the surface of the metal, which, if oxidizable, is thereby corroded. This is the action which has destroyed the water-pipes. The gas-pipe happened to be laid in bitumen, and was thereby protected; but the gas-meter, touching a damp wall within the influence of the leakage, was affected.

The state of the system of the St. James's and Pall Mall Electric Supply Company, so far as it has been brought to Major Cardew's

notice, may be briefly summed up as follows: In September last, two explosions occurred, due to accumulations of gas and water respectively—a faulty pilot wire causing the explosion of gas. On the 3rd of November, he held an inquiry into these explosions; and, from information given by the Engineer to the Company, he proposed a test, which was carried out shortly afterwards, and revealed the existence of a very serious earth connection on the negative main. This the Company were unable to localize and remove, and it continued in existence until the 5th of April, when it was removed by disconnecting the section of main opposite Mr. Peat's. The local effect of this fault has been the damage now reported upon. But it is certain that an equivalent oxidation of metal must have occurred on the positive main, or the house wires and apparatus connected with it; and it is not yet proved that this destruction has been so distributed as not to amount to material damage at any one point. On examination, it is again discovered that the fault originated in the pilot wires. In his report on the inquiry, he recommended that the Company should at once remove all pilot wires from the interior of their conduits. The Company stated, in answer to this, that they would, as far as possible, be removed; but that they found the wires had in many cases adhered firmly to the bottom of the culvert, and could with difficulty be detached. In the portion of culvert which was opened on the 5th ult., these wires did not, however, appear to be adherent to it in any part.

Major Cardew considers that the steps to be taken by the Board of Trade to provide against the recurrence of similar faults and their consequences will require very mature consideration; but he says that he has no hesitation in recommending that the Company should, without further delay, remove every portion of the pilot wires from their culverts, and should test throughout their system for the existence of any appreciable difference of potential between the iron culverts and the gas and water pipes.

Since Major Cardew's report was made, Mr. G. F. L. Foulger, the Distributing Engineer of The Gaslight and Coke Company, has reported to the Secretary and General Manager another case of damage by electric current to a meter and fittings at No. 56, Pall Mall. He states that the Company have a 10-light check meter fixed at the top of a water-closet in the bath-room on the second floor, near to a small cistern, the water-supply pipe of which touches the back of the meter, near which are electric fittings. The gas is used for heating purposes only, and is now, by request of the consumer, temporarily dispensed with. On the 25th ult., the occupier was startled by the noise of an explosion. The housekeeper saw smoke in the passage; and, perceiving a smell of gas, at once turned the tap off at the meter. The meter and fittings were damaged, and also the cornice and ceiling. Apparently there was a small escape of gas from the consumer's fittings; and this was evidently ignited by the electric current. The Company's inspector informed his chief that he subsequently saw electricity issuing, in the form of a blue spark an inch long, from the electrical fittings at the point in question. The ignited gas melted the solder on the top of the meter, as well as the lead inlet-pipe. Mr. Foulger adds: "I cannot too forcibly call attention to the dangers these electric wires present to our fittings; they arise in such a variety of ways hitherto unsuspected by electrical engineers, and also, I apprehend, by insurance companies. The risk of fire being attributed to us, when all evidence of the real cause may be effaced, is, to my mind, a very grave one."

THE BIDEFORD TOWN COUNCIL AND THE GAS COMPANY.

Further discussion on the question of the purchase of the gas-works and the adoption of electric lighting took place at the meeting of the Bideford Town Council yesterday week. The Gas Committee reported that the Gas Company had offered to sell their works to the Town Council for £16,000, *plus* the value of stock, residual products, &c.; and that they had made a counter-offer of £13,000, and the stock at a valuation. The Committee had, however, received no reply to their offer. Mr. Ascott expressed his conviction that the Directors of the Company were simply keeping the Council "dilly-dallying" about until it was too late to oppose their Provisional Order. It was decided that a meeting to specially consider the situation should be held on Wednesday. This meeting was accordingly held; and, at its commencement, Mr. Squire said, as no communication had been received from the Gas Company, he proposed that the estimate from Messrs. Tardrew and Son for the supply of electric lighting be opened. This was agreed to. The estimate stated that plant for the electric light would cost about £4680, and the annual cost of maintenance something like £620. Mr. Squire observed that the cost of maintenance was rather more than he expected. It appeared to him, however, that, if the Council erected an electric lighting plant of their own, they could supply private consumers, and make a profit. In answer to Mr. Restarick, the Mayor said the Council last year paid the Gas Company £490 for lighting the town lamps. The question of electric lighting was referred to a Committee. Mr. Narraway then proposed that the Council offer the Gas Company £14,000 for their works. This would be at the rate of £20 per share, *plus* 10 per cent. for compulsory purchase. He thought that opposing the Provisional Order in Parliament would be unwise, and a waste of public money. The Council should, however, see that a clause was inserted giving them power to acquire the Company's works at a future date, if they did not do so shortly. Mr. Squire, in seconding the proposition, said if the Company would not meet them, the best course would be to put up an electric lighting plant of their own. Mr. Braund believed that, however much the Council tried, they would not get the Company to take less than £16,000. This was clearly their price; and to offer less was, in his opinion, a waste of time. Mr. Pollard maintained that the Council, by expending £7000, could erect better and more modern works than those owned by the Company. He favoured the suggestion to oppose the Provisional Order in Parliament. The resolution was carried by eight votes to three. On the suggestion of the Mayor, it was resolved that the members should meet in Committee, and consider the clauses of the Company's Order *seriatim*.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly General Meeting of this Association was held last Tuesday, at the City Terminus Hotel, Cannon Street, E.C.—Sir JULIAN GOLDSMID, M.P., in the chair.

The SECRETARY (Mr. R. S. Gardiner) read the notice calling the meeting, and subsequently the following report of the Directors:—

The present half-yearly ordinary general meeting of the proprietors has been convened in conformity with the Association's Acts of Parliament, for the purpose of receiving a report from the Directors upon the affairs of the Company, and of declaring a dividend for the half year ended the 31st of December last.

The following summary shows the results of the Association's operations during that period:—

The quantity of gas made in the half year ended the 31st of December last was 4261 million cubic feet; and the quantity made in the corresponding half year of 1890 was 4163 million cubic feet—being an increase of 98 million cubic feet, or at the rate of 2·36 per cent.

The total number of lights on the 31st of December last amounted to 1,975,039; there being at that date 136,452 consumers on the books of the Association. At the close of the corresponding half year of 1890, the number of lights was 1,901,253, which gives an increase of 73,786, or at the rate of 3·88 per cent.

The entire length of mains on the 31st of December last was 1605 miles; and the length of mains laid on the 31st of December, 1890, was 1546 miles—an increase of 59.

The gas-rental also shows an increase on the corresponding half year; but the profit earned has been somewhat less, owing chiefly to the excessive cost of coal; the value of coke and other residual products having remained about the same.

The plant and mains at all the stations were maintained in a due state of efficiency; and the new gasholder on the Association's Tabor Works at Vienna was successfully brought into action.

The Directors have to report that they have obtained a prolongation of the concessions for the lighting of Berchem and Borgerhout—suburban Communes of Antwerp—until the year 1927. They have also obtained concessions for the lighting of Haaren—a suburban Commune of Aix-la-Chapelle—and of Zehlendorf and Friedenau, suburban Communes of Berlin.

The Directors have sold land for which there was no further use at Aix-la-Chapelle, Berlin, Ghent, and Rotterdam, and have purchased land at Frankfort.

The Directors have to record with regret the retirement from the Board, on account of ill-health, of Mr. George Simpson, who had given them useful assistance for thirteen years. They have filled the vacancy thus created on the Board by electing Sir James Carmichael, Bart., a Director of the Association.

They have further only to draw the attention of the proprietors to the accounts for the half year ended the 31st of December last. These have been duly audited; and from them, the Directors have, in accordance with the provisions of the Companies Clauses Consolidation Act, prepared a scheme showing the profit of the Association for the half year, and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—namely, a dividend of 5 per cent. for the half-year ended the 31st of December last, and a bonus of 1 per cent., both payable, free of income-tax, on and after the 1st day of June next.

The Directors who go out of office by rotation are: Clarence Pigou, Esq., the Hon. E. C. Leigh, John Horsley Palmer, Esq. These gentlemen are eligible for re-election, and offer themselves accordingly. The Auditor who goes out of office by rotation is Montague Somes Pilcher, Esq., who is eligible for re-election, and offers himself accordingly.

The CHAIRMAN said that it would not be necessary for him to detain the proprietors at any length on this occasion, though he would pursue the usual course at their meetings, and make a few observations upon the working of the half year, after which he would tell them anything which he considered of interest that had occurred since the accounts closed on Dec. 31. It would probably have been observed that the balance of profit was less than that of the previous half year, and considerably less than that of the corresponding period of the previous year. He informed them upon the last occasion—and he remembered it with regret—that he entertained some hopes that the balance of profit would be larger than it was last half year; but there were two reasons why this had not proved to be the case. The balance of profit for the six months ended the 30th of June last was something above £243,000; and during the half year under review, it was £233,000—showing a diminution of £10,000. The reason for this was very simple when they came to consider the matter and go into the figures carefully, as he had considered it his duty to do. Eighteen months ago, there were strikes and threatenings of strikes all over the Continent; and the result was that their engineers, in common with many others, thought they might have great difficulty in observing the strict regulations of their contracts, supposing that they were prevented from obtaining the necessary supplies of coal; and with the consent—the mistaken consent—of the Directors, they ordered at that time more coal than was then really required. Unfortunately, the coal was very dear; and the strike did not take place. If it had, they would all have been abundantly justified. But it did not; and therefore they had had rather more coal in stock than had turned out to be necessary. The result was that dear coal had extended over a somewhat longer period than would otherwise have been the case, and had come into the present accounts; whereas—this he could tell them with confidence—they knew that during the current half year coal would be obtainable at lower prices, and therefore a larger profit could be expected. It was owing, therefore, to the abundant caution of the officers and Directors that the diminution mentioned in the balance of profit had occurred; but this did not account for the whole of the decrease. He believed that, in spite of what he had said, there would not have been anything like the difference mentioned (but for the exaggerated view which had been taken in the Accountants' office in London. Those gentlemen had thought that certain figures—which it would be too complicated to consider, amounting in all to £8000—ought to be written off the half year. He was away at the time through illness in his family; but he was satisfied (as he believed all the Directors were now) that it would have been fair to spread the amount in question over a much longer period. The result, therefore, would have been, with the figures he would have presented, that the difference in the balance of profit would have been only £2000. Be that as it might,

however, he could assure the proprietors that, under the circumstances, the results shown were, in his opinion, by no means unsatisfactory. Their working exhibited as little loss of gas by leakage as, he believed, any other company on the Continent or in England. He had been frequently asked what the result of the extension of electric lighting was upon the business of the Association. He had told the inquirers that he had hoped—that they all hoped—that other forms of extension in the use of gas would compensate for the disadvantage of the electric light being used in many great establishments instead of gas. He was examining, upon this head, only a few days ago, the accounts prepared with respect to the use of cooking-stoves at their different stations. There was no doubt that in some towns cooking-stoves were much more popular than in others; but he was convinced—and he had figures which showed it—that the loss in gas consumption at night would be very largely replaced by the consumption in the cooking-stoves. This was a large business, which he believed was being extended by many other companies besides their own; and he looked forward still to a considerable increase under this head. Of course, in a great city like Berlin—for instance, in the splendid thoroughfare known as Unter den Linden—they must expect that the modern taste for the electric light would be considerably developed. But this affected the town gas-works at least as largely as their own; and they did all they could fairly to combat it. He still believed there was plenty of work for gas to do; and that the proprietors ought not to be disheartened because of the competition of the electric light. There was no other special matter concerning the business of the half year, excepting the fact that they had made some extended contracts with the suburbs of some of the big towns which they lighted. He had always told the proprietors—and he thought it his duty to repeat it—that it was in very rare cases only that gas companies on the Continent were freeholders; and therefore they had always the possibility of negotiations for the extension or entry into any particular town not being successful. He could honestly say that this question of negotiation was the most arduous part of their work; and the one which showed the least to the general public, and also to the shareholders. But he could assure them that all the Directors were only too anxious to extend contracts, and that they always did all they possibly could to meet the reasonable views (they were not always reasonable) of the authorities with whom they had to deal. So much for the business of the half year. It was, he thought, the ordinary record of industry on the part of their officers. They had endeavoured in every possible way, he believed, to meet the legitimate requirements of the public; and he thought that, on the whole, their efforts had not been unsuccessful. During the half year they had lost, by resignation, the services of Mr. George Simpson. Years ago now, he (the Chairman) being—excepting the Deputy-Chairman, Mr. Newton—the senior member of the Board, invited Mr. Simpson to join the Board. That gentleman had special knowledge of the uses to which tar might be applied; and he had large business experience. He considered Mr. Simpson's special knowledge would be useful to the Board; and he had the pleasure of inviting him to become a member of it. Failing health had compelled him—he believed to his own regret, and certainly to the regret of the Directors—to leave them; and it became their duty to supply his place with someone whom they considered competent to assist in managing the affairs of the Association. He had no difficulty in recommending the Directors to elect his friend Sir James Carmichael, who had seen public and private service, and who was a man of good judgment and large business experience. The Directors, therefore, had had much pleasure in adding him to their ranks; and they trusted that his devotion to their service would prove their judgment to be well justified. With regard to what had occurred since the 31st of December, he did not know that much had happened. One of their oldest officers (Mr. L. G. Drory), their Chief Engineer at Berlin, who had acted as Inspecting Engineer for a few years, had found the latter part of his duties too arduous, and had therefore given it up, remaining as Chief Engineer at Berlin only. They had consulted—he thought to the advantage of the Association, and therefore of the shareholders—a most distinguished outside Engineer, Mr. Corbet Woodall, who had given them the benefit of his experience, which was not confined to the Continent or to England only, but extended, he believed, to many parts of the world. He believed they had exercised sound judgment in this respect, and that Mr. Woodall's knowledge would be of great use to the Association. Then came an even more important matter to them than this. For many years their offices in London had been in Clement's Lane. He had told them before that, in consequence of the extension of their business, the number of clerks crowded into those comparatively small premises was extremely large; and that, for the purpose of doing their business well, and as regarded the health of their employees, the place was very badly arranged and ill-adapted to their requirements now. Some time ago, therefore, they purchased a site in Austin Friars, upon which new buildings had been erected for them; and in the course of two or three weeks, they hoped to transfer their offices there, when they would be well housed. These matters were about all that had occurred since the close of the year. They were discussing various questions still at the Board which might be of benefit hereafter to the Association; but whether their sittings were long or short, he was quite certain of this—that they all acted with the single-minded desire to promote the interests of the proprietors, and to produce the best result they could at their half-yearly meetings. He concluded by moving the adoption of the report.

Mr. NEWTON seconded the motion, which was at once unanimously adopted, without discussion.

The CHAIRMAN then proposed the payment, free of income-tax, on and after the 1st prox., of a dividend of 5 per cent. for the half year ended Dec. 31, and a bonus of 1 per cent., upon the £3,800,000 stock of the Association.

Mr. BASSETT seconded the motion, which was put to the meeting, and adopted.

The retiring Directors and Auditor were then re-elected; and the proceedings terminated with votes of thanks to the Chairman and Directors and the staff.

BOMBAY GAS COMPANY, LIMITED.

The Ordinary Meeting of this Company was held last Thursday, at the London Offices, No. 6, Drapers Gardens, Throgmorton Street, E.C. —Mr. R. DAVIDSON in the chair.

The SECRETARY (Mr. J. H. Perrins) read the notice convening the meeting; and it was agreed to take as read the Directors' report and the statement of accounts, which were referred to in the JOURNAL for the 26th ult.

The CHAIRMAN said the statement of accounts which had been sent to the shareholders represented the period of twelve months ending Dec. 31 last, instead of only six months to that date as heretofore; the half-yearly balance, as the shareholders were aware, having been abandoned, in accordance with the resolution passed at the interim meeting of Nov. 6, 1890. He thought they would agree with him that the result of the year's business was matter for congratulation. The gross revenue amounted to £70,088, and compared with £68,962 received in the previous year, showed an increase to the extent of £1126. Although this might not appear at first sight a large difference, he wished to draw attention to the remarkable increase which had taken place in the item of gas-rental from private consumers; the sale of gas having been 46 million cubic feet, as against 41 million feet; showing an advance on the year of yearly 10¼ per cent. and producing an increased rental of close upon £3000. Bearing in mind the prejudices of the country and other difficulties which their Manager (Mr. Louis Penny) had to contend with in pushing business, this result was most gratifying; and it was worthy of notice that during his ten years' management of the Company's affairs, the receipts from private consumption alone had risen from £15,000 to not far short of double that amount. The number of public lamps in use at the close of the year was 3640—being an increase of 111, and producing a rental of £27,681; but owing to the discounts they had to allow the Municipality under agreement, this was some £480 less. With regard to the sale of residuals, cheaper coal and the fact that the local demand had not kept pace with the increased production, had combined to diminish the receipts for coke, and the like observation applied to tar. This, however, was counterbalanced to some extent by the saving effected in the cost per ton of coal carbonized. The profit on the sale of fittings was also smaller; but this was not altogether an unfavourable feature, as, of course, their object was to promote as much as possible the use of gas among shopkeepers and the like, who necessarily required a cheaper class of goods. Turning to the debit side of the profit and loss account, the shareholders would notice several increases in the items, most of which were a necessary sequence of the expansion of business—such as coal, wages, trade charges, &c. They had carbonized 12,587 tons of coal, as against 10,872 tons, or 1715 tons more, but at a reduction of 4s. 3d. per ton (due chiefly to the prevailing low freights), so that the difference of 1700 tons only cost £286. They would doubtless have noticed the very heavy item for exchange, amounting to £18,812 which was £4424 in excess of the loss made in 1890. This matter had occasioned the Directors considerable anxiety—the average rate for the year being the very low one of 1s. 4 3/32d. per rupee; and, as they were aware, it had fallen still further during the past few months. As previously mentioned, the continued growth in the consumption of gas had rendered an enlargement of plant necessary; and the Directors had sent out a new gasholder, with a storeage capacity of nearly half a million feet, also new boilers, an additional exhauster, and a set of purifiers; new benches of retorts would also be necessary. This would entail considerable expense; but fortunately they had ample capital in hand to meet such a contingency. As most, if not all, the shareholders were aware, the present agreement for lighting the public lamps expired in July next year. The Directors were in negotiation with the Municipality for a renewal, although nothing could be said about the matter at present; but they were hopeful of concluding an arrangement that would be mutually satisfactory. He had only one more matter to refer to, and that was the retirement from the Board of their valued colleague, Mr. Lysley, who had been a Director from the inception of the Company. He was sure his familiar presence would be greatly missed by all at their annual meetings. His place had been filled by Mr. H. E. Jones, a gentleman well known in the gas world, and whose acceptance of the office would doubtless be appreciated by the proprietors. In consequence of this appointment, a vacancy was created in the auditorship. This had been temporarily filled by Mr. Magnus Ohren—a gentleman thoroughly qualified for the position by his knowledge of gas accounts; and he would solicit the shareholders' confirmation of the appointment later on, which of course was entirely in their hands. Proceeding, the Chairman said he should like to say a few words further on the subject of exchange, which was so large an element in their future prosperity. During the last ten years from 1880, they had got their money home at the following rates: 1881, 1s. 7 15-16d.; 1882, 1s. 8½d.; 1883, 1s. 8d.; 1884, 1s. 8d.; 1885, 1s. 7 15-32d.; 1886, 1s. 6 1-16d.; 1887, 1s. 5 3-16d.; 1888, 1s. 4 9-16d.; 1889, 1s. 4¾d.; 1890, 1s. 5 11-16d.; and 1891, 1s. 4 3-32d. Since the date of the accounts now presented, the exchange had fallen 1d. in the rupee, or about 6 per cent., or (as the amount of money they had to remit in a year was about double their profits) about 12 per cent. on the net revenue. This was a somewhat serious outlook, as if exchange did not improve, they might be compelled to reduce the dividend, although every other feature in the business is most satisfactory. About the future of silver, with which the interests of the Company were so closely identified, he was afraid no opinion of any value could be given. No doubt supply and demand would have much to do with it; and on this head he saw by a newspaper that the attempt of the American Government to artificially support the price of silver had led to an increase in the world's production since 1887 of 44 million ounces—viz., from 96 to 140 millions. On the other hand, as the price went down, the production would decrease, and the exports from silver countries—such as India—would be stimulated and increased, thereby causing a greater demand for silver. They also found that as Indian exports increased, outward freights became lower; and the Company were thus able to lay down their coal cheaper. In these respects he saw some hope. As to bi-metallism, much as it would benefit the Company, he could not say he had the least belief in it. He

concluded by moving—"That the report and statement of accounts be now received and adopted, and that a dividend of 4 per cent. be declared, making with the interim dividend already paid, 7½ per cent. for the year, payable on and after Dec. 1 next."

Mr. F. LANE LINGING seconded the motion.

Mr. CUFF said the accounts which they had before them were very satisfactory, and gave them evidence of the great care with which the Directors managed the business. The question of the renewal of the concession was a very important one; and he suggested that, when it was actually decided, the Board should let the shareholders have some information in regard to it. Twelve months would be a long time to wait; and he understood that the matter was to be settled during the coming summer. He also asked whether, supposing there should be a still further depreciation in the value of the rupee, the Directors would think it desirable to raise the price of gas to the private consumers.

Mr. BEARD, referring to the question of exchange, said he recollected on a former occasion suggesting that, if the rate of exchange continued to fall, the price of gas should be raised, as he did not think the shareholders' dividend should be reduced. The report, which altogether was a very satisfactory one, referred to the retirement from the Board of Mr. Lysley; and he should be glad if the Chairman would let the shareholders know why he took that step.

The CHAIRMAN, in reply, said that, when the contract was completed, he did not see how they could intimate it to the shareholders. The mere fact that they had obtained the contract would not be of pressing importance; and all information in regard to it would be at the disposal of any shareholder who called at the office. As to the charge for gas, perhaps they were aware that in India it was 6 rupees, which was about equal to 12s. per 1000 cubic feet, or, at present exchange, it would be about 8s. This compared with 2s. 6d. and 3s. in England; so that it would be a very serious matter to contemplate the raising of the price. Besides, there was the electric light, which, however, except in some private buildings, had made no progress whatever, and for the moment it seemed to have dropped out of sight. As to their late colleague, Mr. Lysley, he retired from the Board for purely private reasons, which had nothing whatever to do with the Company's affairs.

The motion was then carried unanimously.

On the proposition of Mr. C. GANDON, seconded by Mr. LINGING, Mr. Davidson was re-elected to his seat at the Board; as was also Mr. H. E. Jones, on the motion of the CHAIRMAN, seconded by Major W. F. GORDON.

Mr. SUART next proposed, and Mr. W. PARKINSON seconded, the re-appointment of the Auditors (Mr. E. A. Flinders and Mr. Magnus Ohren); and it was agreed to.

The usual complimentary votes were passed to the Chairman and Directors, the Engineer and Manager, the Secretary, and the other officers of the Company, and the proceedings then terminated.

WEST MIDDLESEX WATER-WORKS COMPANY.

The Half-Yearly General Assembly of this Company was held last Tuesday, at the Offices, No. 19, Marylebone Road—Sir W. H. WYATT presiding.

The SECRETARY (Mr. F. H. Wybroo) read the notice calling the meeting; and the report and statement of accounts were taken as read. He afterwards read the Auditors' report, which stated that the cash balance at the bankers amounted to £4673, or, deducting outstanding cheques, to £3788. The investments of the reserve fund were as reported last half year; and the repairs and renewal fund remained as before. The Company had also the sum of £135,000 on deposit at interest with the London and Westminster Bank, the Union Bank of London, the London Joint-Stock Bank, and the London and County Bank. The capital of the Company was the same as in the previous half year—namely £1,372,136; and the total expenditure on works (including £13,479 expended in the past half year) amounted to £1,333,372. The revenue for the six months ended Lady-day last had been £118,708, or an increase of £3957 on that of the corresponding period of 1891. The balance to the credit of the dividend and interest account was £147,324.

The CHAIRMAN, in moving the adoption of the report and accounts, said he thought the shareholders would agree with him that the accounts submitted on this occasion were very satisfactory. It was quite evident, however, that, in allowing the consumers 7½ per cent. discount, they were going as far as they could; for they did not increase, but rather diminished, their reserve fund. On the other hand, they had spent liberally in the half year on repairs and renewals; and he could assure them, from his own observation as well as from the Engineer's reports, that every portion of the works was in first-rate condition, which, of course, was very important. They had also done a good deal of new work in the six months. They had completed the filter-bed at Barnes; new mains had been laid; and the Worthington engines at Hampton and Hammersmith were nearly erected, and would shortly commence working. A constant supply had been extended to two new districts; and the number of houses now so supplied by them was 34,503. He was not sure that this was much advantage to anyone; but sentiment said that they must do it, and they had had to. The next subject referred to in the report was one which must be a matter of anxiety. He alluded to the Royal Commission which had been appointed to inquire and report whether "the present sources of supply of the Metropolitan Water Companies are adequate in quantity and quality." He maintained it was far better for them to have a Royal Commission than a Committee in the House of Commons. He thought they were now in the hands of gentlemen who understood their business; and he was sure they would endeavour to deal, and would probably deal fairly with them. What their report might be, he could not tell the shareholders. All the Water Companies had prepared a full statement as to what their powers and capabilities were. The Commission rather wanted them to show that they could supply the coming wants for the next 40 years. This was "a stiff order;" but they had met it (and, no doubt, the other Companies had done the same) in the very best way they could. The death of Dr. Tidy at the present moment was very unfortunate, as he had been so long one of their Analysts, and, probably, he could have given the Commission better evidence than almost any other scientific man. They had had to supply the vacancy; and he hoped they had done so successfully. It was a matter of great regret to the Directors that their excellent friend, Mr. Hall, after 48 years' service, had felt it necessary to have more quiet; and he had therefore retired. He knew, however, that Mr. Hall, under all circumstances, and at all times, would render the Company every advice and assistance when required. He thought they had acted very wisely in appointing Mr. Wybroo to succeed Mr. Hall. One of their collectors, Mr. Christie, having died, after some years' service, they had made certain alterations in the collecting districts, and had increased the number of collectors from fifteen to sixteen. Mr. Voysey having resigned his appointment as inspector of the Kensington district, Mr. W. B. Hack, formerly an assistant inspector, had been appointed in his place. A Christmas gratuity of 5 per cent. had been given to the staff; and, as he had already said, a rebate of 7½ per cent., amounting to more than £17,000 per annum, had been allowed to their consumers. These were heavy "pulls" upon them; but as long as they were able to do so, they were very glad to let everyone share in the prosperity of the Company. The accounts for the half year enabled them to recommeud the usual dividend.

The DEPUTY-CHAIRMAN (Mr. J. Meyer) seconded the motion, which was carried unanimously.

The CHAIRMAN proposed the payment of a dividend on the consolidated stock at the rate of 10 per cent. per annum; and, in answer to a question, he said it was impossible to pay the dividend free of income-tax, as 10 per cent. was their maximum distribution.

The DEPUTY-CHAIRMAN seconded the motion, which was adopted.

The retiring Directors (Mr. J. Pomeroy, the Hon. Baron Dimsdale, M.P., Mr. H. W. Prescott, and Mr. E. Cumberlege) were afterwards re-elected, as were also the Auditors.

On the motion of Sir RICHARD WYATT, seconded by Mr. BLUNNDELL, a vote of thanks was passed to the Chairman and Directors for their diligent attention to the business of the Company, and their able and satisfactory management of its affairs.

The CHAIRMAN, in acknowledging the compliment, said there was no doubt that Directors of Water Companies had an anxious time before them, and probably no one knew this better than the mover of the resolution, who was himself a Director of a Water Company. However, he (the Chairman) had great confidence that everything would come out well in the long run; and that, if their undertakings were acquired, the Companies would receive fair and reasonable terms. They would rather not be taken over, but would prefer to go on as they were at present. They must, however, submit to circumstances; but he could not believe that the proprietors would be deprived of what was their fair and just due. There had been a great panic, as they knew, in the stocks of most of the Water Companies—no doubt led on by unscrupulous remarks which had been made elsewhere, and the evident desire on the part of some persons to depreciate their property; but he did not think these efforts would have any effect on the Companies in the long run.

The proceedings then terminated.

The Proposed Augmentation of the Water Supply of Gloucester—Having regard to the various and difficult questions involved in coming to a decision as to the best means of obtaining an increased water supply, the Gloucester City Council have just resolved, on the recommendation of the Water Committee, to lay all the reports on the subject before Mr. James Mansergh, C.E.

New Joint-Stock Companies.—Among the new joint-stock undertakings lately started is the Smokeless Boiler and Engineering Company, Limited, with a capital of £100,000, in £5 shares. It proposes to acquire certain inventions and letters patent for the United Kingdom and the Isle of Man relating to improvements in gas-fired steam generators, in accordance with an agreement made between the Jackson (British Patents) Company, Limited, of the one part, and the Company of the other part, and generally to carry on business as boiler and furnace makers, mechanical engineers, &c.

Fire at the Old Kent Road Gas-Works.—About half-past nine o'clock last Friday night, information was received at the South London fire station that a serious fire was raging on the property of the South Metropolitan Gas Company in the Old Kent Road. The first intimation received was the ringing of the Canal Bridge Road fire alarm into the Old Kent Road fire-station; and in a short time the manual which was turned out came back with the news that a building of two floors, about 60 feet by 30 feet, belonging to the Company, was well alight. The Fire Brigade authorities instantly despatched steamers and men to the scene; and it was found that the building, which was used as a recreation room and stores, was alight from end to end. The Company's men had first brought to work one of the manual engines kept on the premises; and, the firemen promptly aiding with other deliveries, the flames were prevented spreading. The fire was overcome soon after ten o'clock; but the structure in which the mischief had originated was entirely destroyed.

Nottingham and Derby Water Gas Company, Limited.—A meeting of the shareholders in the Nottingham and Derby Water Gas Company, Limited, was held last Thursday at the Cannon Street Hotel (by order of Mr. Justice Stirling), for the purpose of considering a scheme of compromise in relation to the Company's claim against the British Water Gas Company for a return of the purchase-money. Mr. Weston (the Liquidator) presided, and explained that, under the scheme, £15,000 would be paid to the parent Company, which would allow of a return of £1 15s. per share to the shareholders. The balance would be retained until the liquidation accounts were presented, and then there would be a further distribution. Several shareholders expressed their approval of the scheme, and the voting-papers were then deposited. There were present at the meeting, in person and by proxy, 181 shareholders, representing 9225 shares, who voted for the payment of the £15,000 in full settlement of the claim against the Company. Those who voted against the arrangement numbered only five, representing 170 shares.

PARIS GAS COMPANY.

The Report and Accounts for the Year 1891.

The following is an abstract translation of the report of the Directors of the Paris Gas Company for the past year (presented at the recent annual general meeting of shareholders), with the accounts for this period in our usual condensed form.

Commencing with consumption, the report states that in the past twelve months there were sent from the works 311,929,550 cubic metres, or about 11,013 million cubic feet, of gas; being an increase of 4,067,670 cubic metres, or about 142 million cubic feet, on the output in the preceding year. These figures are only 328,500 cubic metres lower than those of the exceptional consumption in the Exhibition year of 1889. Of the entire quantity of gas sent out, 84,459,525 cubic metres, or 26·45 per cent., was consumed in the daytime, for industrial and domestic purposes. The use of gas for culinary operations is daily making further progress; something like 125,000 cooking-stoves having been placed by the Company at the disposal of their customers during the past few years. Heating by gas is also being more widely adopted in Paris, owing to the elegance of the stoves which makers of these appliances are now showing. The receipts from the sale of gas last year amounted to 79,606,950 frs. (£3,184,278), as compared with 79,069,443 frs. (£3,162,778) in 1890. Of the former amount, 73,141,065 frs. came from the city, and 6,465,885 frs. from the surrounding districts. The number of consumers on Dec. 31 last was 242,339; surpassing by 9329 the total at the corresponding date in 1890, in which year the increase was 8891. The number of public lamps in use at the close of the past year was 77,076, of which 66,573 were employed in lighting the city. In this total are included 2127 recuperative burners; and to these must be added 2298 similar appliances in use by consumers—making altogether 4425 high-power burners, corresponding to 31,100 jets of the ordinary type. The fixing of large service-pipes up buildings, to supply the occupants of the various "flats," was continued briskly last year; no less than 2250 being put in. Deducting 30 of these pipes thrown out of use, the total at the close of the year was 32,450, distributed over 25,326 houses. Only 293 of the pipes fixed in 1891 were put into new houses; the rest were for the service of apartments already occupied by people who were willing to employ at once a sufficient quantity of gas to compensate the Company for their outlay. At the end of the year there were no less than 118,786 consumers taking gas from these pipes; being 8290 more than the number at the corresponding period of 1890. As a matter of fact, the consumers served in this way now represent nearly half the total number of the Company's customers; whereas 15 years ago the proportion was only 23 per cent. With regard to the works, as they were found equal to requirements, no very important additions were made thereto. The distributing plant, however, was increased to the extent of 39,913 metres, or 44,000 yards, divided pretty equally between Paris and the suburbs. This brought up the total length of mains at the close of the year to 2,269,594 metres, or rather more than 1400 miles, of which 940 miles are beneath the streets of the city.

Turning to the financial part of the report, we find that the expenditure on capital account last year amounted to 3,776,707 frs. (£151,068), of which 1,497,073 frs. were spent on house service-pipes, 1,185,361 frs. on ordinary service-pipes and meters, and 570,067 frs. on the works at Le Landy. The capital account stood as follows on Dec. 31, 1891:—

	Francs.		Sterling.
Amount expended to Dec. 31, 1890	282,649,582	..	£11,305,983
Do. do. during 1891	3,776,707	..	151,068
	286,426,289	..	£11,457,051
To meet which there has been raised—			
By shares. 84,000,000 frs.			
By bonds 221,550,639 „			
	305,550,639	..	12,222,025
Showing an unexpended balance of	19,124,350	..	£764,974

The following is the working account for the past year:—

Expenditure.

	Francs.		Sterling.
Value of gas in store on Jan. 1, 1891	52,210	..	£2,088
Manufacture of gas—			
Coals carbonized	22,282,069	..	891,283
Coke and tar for heating purposes	4,731,551	..	189,262
Salaries and wages	4,868,459	..	194,738
Maintenance of works and plant	2,119,281	..	84,771
Incidental expenses of carbonization	1,702,191	..	68,088
Purifying materials	513,647	..	20,546
Distribution—			
Salaries of engineers and officers	1,719,177	..	68,767
Repairs, &c., mains and services	1,171,418	..	46,857
Miscellaneous expenses, stamps, &c.	388,099	..	15,524
General management—			
Directors and Executive Committee	300,000	..	12,000
Salaries	1,111,656	..	44,466
Office and other expenses.	348,896	..	13,956
Service, accidents, relief, &c.	319,825	..	12,793
Law and other charges	31,887	..	1,275
Bad debts	8,597	..	344
Rents and insurances	217,320	..	8,693
Interest on loans	8,370,050	..	334,802
Loan redemption fund	7,874,400	..	314,976
Share redemption fund.	2,495,250	..	99,810
Cost of experiments, &c.	91,899	..	3,676
Pension and provident funds	267,790	..	10,711
Municipal charges—			
Tax of 2 c. per cub. met. of gas sold.	5,397,317	..	215,893
Rent of subsoil occupied by mains, &c.	200,000	..	8,000
Lighting, extinguishing, and maintenance of public lamps (less amount paid by Municipality)	1,073,427	..	42,937
State charges—			
Official gas testing, stamps, &c.	1,117,118	..	44,685
Total expenditure	68,773,533	..	£2,750,94

Revenue.

	Francs.		Sterling.
Value of gas in store on Dec. 31, 1891	53,760	..	£2,150
Sale of gas	79,606,950	..	3,184,278
Residual products—			
Coke	17,693,605	..	707,744
Tar.	2,366,558	..	94,662
Ammoniacal liquor	1,314,226	..	52,569
Rental of meters and fittings on hire	3,169,169	..	126,767
Fire-bricks, &c.	155,633	..	6,225
Interest and discount	1,194,090	..	47,764
Miscellaneous	40,816	..	1,633
Total revenue	105,594,807	..	£4,223,792
Deduct expenditure	68,773,533	..	2,750,941
Balance, profit for 1891	36,821,274	..	£1,472,851
Deduct balance of 1890 liquidation.	7,606	..	304
Deduct to meet outstanding claims.	213,668	..	8,547
Balance available for distribution	36,600,000	..	£1,464,000
Deduct for share dividend	11,200,000	..	448,000
Balance, divisible equally between the Company and the Municipality	25,400,000	..	£1,016,000

The total amount available for distribution among the shareholders is therefore as follows:—

	Francs.		Sterling.
Dividend as above	11,200,000	..	£448,000
Half of divisible balance	12,700,000	..	508,000
Portion of annuity (now compounded) payable by Municipality	50,000	..	2,000
Balance of undivided profits	66,965	..	2,678
Total	24,016,965	..	£960,678
Deduct 1 fr. per share for reserve fund.	336,000	..	13,440
Balance	23,680,965	..	£947,238
Deduct interim dividend of 12 frs. 50 c. per share paid in October last	2,692,213	..	107,688
Balance available for final dividend	20,988,752	..	£839,550

The balance allowed of a further payment of 62 frs.; making in all 74 frs. 50c. per share of 250 frs., or at the rate of 29·8 per cent., and leaving 156,752 frs. (£6270) to be carried forward. The dividend is 50 c. per share lower than that for 1890, notwithstanding the increase in the consumption of gas. The difference is explained by a slight rise in the price of coal, the extra cost of labour, and the additional charges occasioned by the last loan.

With regard to residuals, the latter months of the past year were not favourable for the sale of coke. Stocks, however, were not augmented. The advance in the price of coal naturally raised the value of coke; and the returns from the sales were 1,941,720 frs. more than in 1890—viz., 17,693,605 frs. against 15,751,885 frs. Tar and ammoniacal liquor were affected by the over-stocked market; and the amount realized by the sale of these products was only 3,680,784 frs., as compared with 3,890,170 frs. in 1890—a drop of 209,386 frs., or 5·38 per cent. The consumption of gas for motive power and culinary and heating purposes does not show any signs of falling off in Paris. Last year, 3,800,000 cubic mètres of gas were used in gas-engines of various powers. The Company have always made a point of encouraging the consumers to use gas-stoves; and lately they have had under consideration the best types of these appliances, suitable for heating purposes, by French and foreign makers. They have themselves patented several models, which, alike for elegance, calorific power, and economy, they believe will commend themselves to the Parisians. With the special object of directing public attention to the variety of applications, both domestic and industrial, of which gas is susceptible, and to afford as much information on these matters as possible, the Company have opened a show-room in one of the principal thoroughfares of the city—the Rue du Quatre Septembre, where, in the early days of the introduction of electric lighting, they made so successful a display of gas by means of improved burners and lanterns which have since borne the name of that street.

The usual particulars are given in the report in regard to the various provident and other funds connected with the Company; and the statistical portion of the document closes with a short reference to the perennial question of the suggested reduction in the price of gas. This matter has been under discussion, in one form or another, for something like ten years. After being dropped, taken up again, and then abandoned, it was seriously considered by the Municipal Council at the beginning of the year 1890. The problem before them was how to reduce the price from 30 c. to 25 c. per cubic metre for lighting and heating gas, and from 30 c. to 20 c. per cubic metre for that employed in the production of motive power. The diminution in the receipts which would result from the change was estimated at from 10 to 11 million francs per annum. To compensate for this drop, it was proposed to spread the capital charges over a greater period; and it was hoped that, by prolonging the concession by 25 years from 1905, a means would be found of conciliating the consumers, the Municipality, and the Company. This combination, which at the outset appeared to be acceptable, was in the end discarded. It was considered that, instead of resorting to an extension of the concession, it would be preferable to suspend the amortization of the bonds until Dec. 31, 1905, and leave to the City the responsibility of indemnifying the bondholders by charging the working after the termination of the existing concession with the restitution of the capital not paid off at the latter date. Upon these new bases the Company have lately been invited to enter upon fresh negotiations. The Directors state that, in the conferences which have taken place, the Municipality and the Company have manifested an equal desire to come to an understanding. But the proposed combination, although to all appearance so simple, gives rise to legal difficulties which need careful examination; and therefore no information can be afforded to the shareholders as to when the question is likely to be settled.

In the section of the report devoted to the changes in the administration, fitting reference is made to the loss the Company have sustained

by the death of the Chairman—M. Fernand Raoul-Duval—who, after filling various offices, became Vice-Chairman in the year 1884, and succeeded M. Eugène Preschez as Chairman in 1887. He attended or presided at all the negotiations between the Company and the Municipality on the question of the price of gas; and it did not rest with him that these were not brought to a satisfactory conclusion. His successor on the Board is his son, M. René Raoul-Duval, who, as a Director of the Neapolitan Gas Company, has already had experience in the administration of a gas undertaking.

THE ELECTRIC LIGHTING QUESTION AT TAUNTON.

Report of Mr. Gisbert Kapp.

Our readers are aware that some weeks ago the Taunton Town Council held a special meeting to consider the question of purchasing the plant of the local Electric Lighting Company, as to the advisability of which opinion seems to be very much divided—the undertaking being in a rather low condition. On the eve of the Council meeting, the ratepayers decided, by a small majority, against the proposal to purchase the Company's works; but the councillors showed themselves to be more hesitating, and they adjourned the question for a month—an expert to be employed in the meantime to report upon the suitability of the present buildings and plant for the electric lighting of the town. They had already had two reports—one by the Joint Committee entrusted with the matter, and the other from the Borough Surveyor—but they wanted a third; and this they now have. The expert called in, on the suggestion of the Board of Trade, to assist the Council with his advice was Mr. Gisbert Kapp, M.Inst.C.E.; and his report, dated the 26th ult., came before the Council at a special meeting held on Tuesday last. As the two previous reports have been summarized in the JOURNAL (see *ante*, p. 589), we give a few particulars from the one last submitted.

Mr. Kapp visited the works on the 14th and 15th ult.; and he opens his report with a full description of them. They comprise a central station, a complete system of overhead wires now supplying about 30 arc lamps for street lighting, and 40 arc lamps for private lighting, a number of incandescent lamps of various capacities, equivalent to 500 lamps of 16-candle power, and three sets of storeage batteries. The central station stands on a piece of land 14,570 square feet in area. He next describes in detail the generating and distributing plant, and states that, with a few exceptions, the whole of it is in good, and some even in excellent condition. Dealing with the methods of working, Mr. Kapp explains that the supply of electrical energy from the station is at present intermittent; the machinery being started in the afternoon, and kept going till one or two o'clock in the morning only. Although such a manner of working is, generally speaking, conductive to economy, it has not, he says, been so in the present case. He has estimated approximately the number of units supplied for private and public lighting, and the amount of coal consumed; and he finds that for the delivery of 80,000 units during the year 1891, 870 tons of coal were burned—being at the rate of about 24 lbs. of coal per unit delivered. Had the Company been working under a Provisional Order and been compelled to keep the pressure on the mains for private lamps continuously, the consumption of coal per unit supplied would have been still greater. Under the favourable conditions of intermittent supply, Mr. Kapp says the consumption of 24 lbs. per unit delivered is far too large. Modern and well-designed stations giving uninterrupted direct-current supply at low pressure, require from 9 to 15 lbs. of coal per unit; and alternating-current stations affording uninterrupted supply, require from 12 to 24 lbs. of coal per unit. There are, he says, chiefly two reasons why the coal consumption in the Taunton station is so large. In the first place, the average load on the alternators is very small in comparison with the rated power of the engines; and in the second place, the efficiency of the arc lighting plant is low, owing to the interposition of a heavy countershaft between the engines and dynamos. This defect cannot be remedied with the existing plant; but the efficiency of the alternating plant would be materially improved if, instead of 500 lamps, three or four times the number were connected, and the supply were still carried on intermittently as now. Should it, however, be necessary to give an uninterrupted supply (as is generally the case when the undertakers work under a Provisional Order), he says it would only be possible to attain a fair efficiency by the addition to the present plant of a small engine and alternator for daylight work, and the establishment of sub-stations with large and small transformers. Passing on to consider the commercial results, profit, &c., Mr. Kapp says that the station has been worked in a manner as economical as the nature of the plant permitted; and he does not think that in future it will be possible to reduce expenses. The commercial results can therefore only be improved by increasing the receipts. The receipts were, in round numbers, about £1110 from arc lighting, and £410 from incandescent lighting; the latter being charged at an average of 1s. per candle power per annum, while each private arc lamp produced £10 per annum. The 41 private lamps consumed during 1891 about 17,000 units; and the income from them was £410, which comprised the payment for the rent of the lamp, the carbons consumed, and the current supplied. Deducting £80 for the rent of lamps and carbons, the 17,000 units were supplied for £330, which is at the rate of 4·65d. per unit. Since the cost of producing a unit was during 1891 about 5·7d., it is clear that the private arc lighting was a loss to the Company. If the current for these lamps had been charged by meter at 8d. per unit, there would have been a small profit on the private arc lighting—each lamp earning about £14 per annum. Provided the consumers would submit to the additional charge as determined by the meter, the adoption of meters would increase the income; but he does not think it would affect that derivable from incandescent lamps. If the current were charged at 8d. per unit for private lamps, the income would be £2900; but as, in order to earn this, extra plant would be required, bringing up the total working expenses to £2450, there would be left only a gross profit of £450. This would not be obtainable supposing the station had to be worked continuously instead of intermittently. If the former, the profit would be converted into a loss. Coming to the existing system of supply, Mr. Kapp thinks it is not suitable to local conditions. The central station lies within a comparatively small district, and the whole of the lighting is comprised within a radius of 800 yards. As distances up to 1200 yards are well within the reach of the three-wire system with uninterrupted direct-current supply, and as the whole profitable lighting area of the town lies well within this limit, there is, he thinks, no need for the alternating-current system. Taunton could, he says, be very efficiently lighted on the direct-current system; the generating plant including storeage batteries, so that an uninterrupted service could be given without the necessity for working the machinery for more than ten hours daily. After dealing with the Board of Trade requirements in regard to electric lighting, Mr. Kapp comes to the important question of purchase. On this point he says: "The price suggested for the purchase in the report of your Joint Committee is £10,000; and if the design of the station had been such as to fully meet the conditions indispensable for economical and efficient working, as well as the requirements of the Board of Trade, I should consider this price a fair and reasonable one to pay for the land, buildings, machinery, and distributing plant. Unfortunately, however, the design of the station, and the whole system under which the light is at present supplied, is not such as will allow of economical working, if the supply is to be continuous, such as the consumers would have a right to demand; and therefore I cannot advise you to buy up the works as a going concern, or in any such manner as would compel you to carry on the present system of supply." He then proceeds to show how, if the Council determine to undertake the supply of electrical energy, this may be done—viz. (1), by erecting and working an entirely independent station; or (2), without buying up the whole of the present plant, by purchasing so much of it as can be profitably employed in the reconstruction of an improved central station and distributing system—leaving the Company free to sell the rest of their plant in the open market. As the former plan did not come within his instructions, Mr. Kapp confines himself to the latter. This he discusses at some length—going fully into all details. Assuming that the total requirements of Taunton for the next four or five years will not exceed 44 street arc lamps, and 2000 16-candle power glow lamps, or their equivalent in arc lamps and glow lamps of other candle power for indoor lighting (of which not more than 1400 will ever be required to burn at the same time), he finds the cost to be as follows: Price to be paid to the present Company for their central station and material, £5250; cost of additional plant at central station, £3700; feeders, mains, house connections, and meters, £5300; 44 arc lamps and mains, £1650—total, £15,900. To this he says £1000 should be added for working capital; so that the total sum the Corporation would have to borrow would be £17,000. The annual payments on this sum would be £880, which added to the working expenses (£1780) brings up the total annual outlay to £2660. The total revenue he estimates at £2900; showing the small profit of £240 on the working of the station, which would be increased with the use of the current for motive power, and the further employment of the light up to the ultimate capacity of the station. Mr. Kapp's general conclusions are as follows: (1) The present electric lighting system is not suitable for small areas, and cannot be worked at a profit if the supply must be continuous. For this reason I cannot advise you to buy the undertaking as a going concern. (2) Taunton can be lighted most economically on the direct-current low-pressure three-wire system, with batteries to take the day load. (3) If you determine to start an entirely new station, it should be placed close to the river. (4) If you determine to utilize the existing station, you can take over the buildings, boilers, engines and accessories, and 44 iron posts; paying the Company £5250. (5) The existing countershafting, dynamos, alternators, transformers, batteries, overhead mains, and arc lamps not to be taken over, but to be removed by the Company. (6) The total cost of complete works suitable for the supply of 2000 16-candle private glow lamps, and 44 street arc lamps, is £15,900. The annual working expenses will amount to £2660, including repayment of loan; and the annual revenue will amount to £2900.

At the same meeting, the Joint Committee reported that, having considered the report of the expert, they could not recommend the Council to purchase the undertaking at the sum of £10,000. The Mayor, as Chairman of the Joint Committee, moved the adoption of their report. In doing so, he said that, in making the simple recommendation that the works should not be purchased for £10,000, they did not intend that negotiations should be stopped. He could call their attention to the small matters of defect pointed out by the expert; but the favourable points included the fact that the whole of the plant was in good and excellent condition, had been well cared for, the installation was remarkably good, and if the Council decided to purchase the undertaking as a going concern the sum of £10,000 was a reasonable one. With regard to the system; of lighting, the report condemned the Thomson-Houston system; but he thought the residents of Taunton had reason to be proud of it. Alderman Van Trump seconded the motion, so far as it recommended the Council not to purchase the works for £10,000. Alderman Farrant moved, as an amendment—"That the consideration of Mr. Kapp's report be postponed until the next meeting of the Council; and in the meantime that the Committee obtain information as to the successful working of the Thomson-Houston system, and also whether Mr. Kapp is in any way interested in any other system or patents in connection with electric light." This was carried with one dissentient. The Mayor then moved a resolution to the effect that steps should be taken at once to obtain from the Board of Trade their view on the subject of overhead wires, uninterrupted supply, and of having arc lamps at high pressure in shops and houses; and it was adopted.

The Water Question at Mansfield.—The Water Committee of the Mansfield Town Council have decided to engage an expert to consider the question of the water supply of the town and the report of Mr W. H. Dalton, F.G.S., to which reference was made in our issueof. the 12th ult. (p. 678). Professor Green, of Oxford, Professor Lapworth, of Mason's College, Birmingham, and Mr. T. Hawksley, are to be communicated with.

GAS AND ELECTRIC LIGHTING AFFAIRS AT SALFORD.

At last Wednesday's Meeting of the Salford Town Council, two or three interesting matters relating to gas and electric lighting came before the members.

The first subject to engage attention had reference to certain statements recently made in the Committee-room of the House of Commons, during the proceedings on the Swinton and Pendlebury Gas Bill, with regard to the quality of the Salford gas. Mr. Phillips, the Acting Chairman of the Gas Committee, stated that surprise visits had been paid to the gas-works by Mr. J. Hepworth, of Carlisle, and Mr. Thomas Newbigging, of Manchester; and both these gentlemen reported that they had found the gas pure, and that it was of more than the illuminating power required by the Act of Parliament. Mr. F. Jones, the Consulting Chemist, reported that the average illuminating power at the Bloom Street station during the past year had been equal to 18·86 standard candles, and at the Regent Road works, to 18·71. The Committee were doing all they could to supply gas that was pure and of high illuminating power; and he was glad to say there were never fewer complaints from consumers than at the present time.

Subsequently, the Council approved of a resolution of the Gas Committee to the effect that the tender of Messrs. Ashmore, Benson, Pease, and Co., Limited, of Stockton-on-Tees, for cast and wrought ironwork required for the construction of a new four-lift gasholder and guide-framing, for the Liverpool Street gas-works, for the sum of £12,000, and also for old wrought iron at 30s. per ton, and cast iron at 20s. per ton, be accepted.

A report was also submitted by the Committee on the subject of the proposed scheme of electric lighting. It stated that, in view of the replies to the circulars issued throughout the borough, it had become evident that the scheduled area proposed originally, and included in the Provisional Order, would not meet the ascertained requirements, and consequently the contemplated expenditure in lighting the area was not advisable. They, therefore, deemed it their duty to seek the instruction of the Council as to an application to the Local Government Board for a modification of the area of supply, and other incidental matters. After due consideration, it appeared that, to meet the demand for the electric light received through the circular referred to, a scheme of a different character, and upon a larger scale, would be necessary; and consequently the sum of £15,000 which was mentioned as the probable cost of a first installation must be increased to £30,000, as any smaller installation would be of very little use to the borough. Mr. Phillips, in moving the adoption of the report, admitted that the electric light at one period of the year would not pay, but that period would be succeeded by another when it would pay its expenses, and before long begin to make some return. He instanced Bradford, where the electric lighting, on which there was at first a loss, now showed a profit of £1000. Mr. Roper seconded the motion, which was carried. Mr. Snape then proposed that the Gas Committee proceed with the preparation of a scheme, and get out a specification and present the same, with tenders, to the Council for an installation amounting to not more than £30,000. The Town Clerk pointed out that the Council had the power at the present time to supply the whole of the borough; but they were doing it piecemeal. Alderman Mottram seconded the proposition, which was carried by 33 votes to 12.

EXHIBITIONS OF GAS APPLIANCES.

The exhibition of gas-stoves and other appliances which was held at Sheffield last January was so successful that another has been organized, and was opened yesterday week by Mr. E. W. T. Richmond, of the firm of Messrs. Richmond and Co., Limited, of London and Warrington. In addition to the gas-stoves, there is shown by the Sheffield Gas Company a large collection of chandeliers, brackets, globes, and other fittings, together with many novelties in gas-burners. The exhibition will continue during the present week; and, as during the past week, Miss Golding will deliver lectures twice daily on the advantages of cooking by gas. A gas exhibition, under the auspices of the Hexham Gas Company, was held in the Corn Exchange in that town from the 25th to the 30th ult., when a good display of cooking-ranges, gas-fires, stoves, &c., was provided by the above-named firm. The lighting exhibits were of a varied character, and included some powerful "Vincent" lamps by Messrs. W. Sugg and Co., Limited, which were much admired. The exhibition was opened by R. Wallis, Esq., J.P. (President of the North of England Gas Managers' Association), who dwelt at some length on the advancement made by the gas industry as a result of similar exhibitions. A series of lectures on cookery were given by Miss Owen to large and appreciative audiences. The arrangements were carried out by Mr. Herbert Lees, the Secretary and Manager of the Company; and the exhibition proved a great success. Messrs. Richmond and Co. also supplied the stoves, &c., at the exhibition at Ramsay (Isle of Man), mentioned in the JOURNAL last week. In the Town Hall, Wycombe, from the 27th to the 29th ult., a successful exhibition was held under the auspices of the High Wycombe Gas Company; the general superintendence being entrusted to the Manager (Mr. W. F. Thurlow). The stoves shown were supplied by the Davis Gas-Stove Company, Limited, whose representative (Mr. Goatley) fully explained their capabilities, which were amply demonstrated by Miss Cameron in a series of cookery lectures. Last week the Davis Stove Company exhibited at Bristol, where Miss Ellen Johnston lectured; at Worcester, where Mr. J. Young, M.P.S., discharged a similar duty; and at Ramsgate, where Miss Rotherham officiated. Under the auspices of the Ascot Gas Company, an exhibition of gas cooking stoves and appliances, manufactured by Messrs. Fletcher, Russell, and Co., of Warrington and London, was held in the Sunninghill Reading Room from Tuesday to Friday last week. Lectures illustrative of the advantages of cooking by gas were delivered each day by Miss Edden. In the Town Hall, Haverhill, the same firm held a gas exhibition, under the auspices of the Local Board, from Tuesday to Friday last week. They had on view a number of their indestructible cooking-ranges and other appliances. The Local Board showed Cowan's wet meters, Peebles's governor burners, and the Wenham, Deimel, and Sugg lamps, by which the hall was lighted. The arrangements were efficiently carried out by Mr. B. Gibson, the Gas Manager to the Board. The exhibition was opened by Alderman Gurteen; and lectures on cookery were given by Miss Rotherham. The exhibition which Messrs. W. Parkinson and Co. held in the Drill Hall, Nuneaton, from Monday to Friday last week, was in every way successful. It was opened by Mr. J. E. Iliffe, Chairman of the Gas Committee; and Miss Woods gave demonstrations in cookery each afternoon and evening, which were well attended. The result was the placing of a large number of gas cooking-stoves on hire among the consumers. At the Albert Institute, Windsor, Messrs. J. Wright and Co., Limited, have lately been holding an exhibition under the auspices of the Gas Company. Lectures were delivered by Miss Page.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The "sensation" which I mentioned last week as being attempted to be created by a writer in the *Scotsman*, with reference to the Edinburgh gas-works, was taken notice of by no one during the week; but to-day the writer himself returns to it. He writes in the *Scotsman*: "The 'authorities' of the gas-works have not seen fit to take up the challenge to deny or explain away the statements contained in my letter to you last Saturday. The truth cannot be denied. There are now seven of the English bricklayers there; and they are likely to be for some time to come, as I understand the whole of the inside of the bench will have to be not repaired but renewed. I would invite the Gas Commissioners to make some inquiry into this matter, and scrutinize the bill closely; and see if this be the best way to keep down the expense." To this the editor of the *Scotsman* adds: "The ratepayers no doubt will be interested whether there is or is not foundation for these statements—Are men at work on the removal or renewal of a bench of retorts recently erected; and, if so, what justification is there for this course? Assuredly, silence on this subject is not the part which the Commissioners ought to play." I am puzzled to know what they are driving at. Last week I thought it was the builder who was aimed at; now it would appear to be someone else. The whole affair is mysterious; but I now incline to the opinion that the author of these communications is a Gas Commissioner, who has taken this method of divulging what was intended to be kept private. The Committees of the Commission have not met since last Saturday, I may point out; and it was therefore not possible either to "challenge or deny" his statements. When they meet, there may or may not be something heard of this subject. From the temper of one of the Commissioners whom I met this week, I presume that it will.

The dream which has floated before the eyes of some southern engineers, and notably of Mr. V. Wyatt, of London, of seeing a number of gas-works combine to carry on a works for the treatment of residuals, is placed within reasonable possibility of accomplishment by the failure of Messrs. John Dobbie, Sons, and Co., of Leith and Elliot. Mr. J. S. Tait, C.A., of Edinburgh, the trustee of the estate, has issued a circular in the following terms: In terms of the instructions given at the first meeting of creditors, I have carried on the works at Elliot and at Leith with the view of these being disposed of on advantageous terms. I have sold the Waverley Chemical Works at Leith; and before closing the sale of the North British Chemical Works at Elliot, it has been suggested to me, by parties having a strong interest in the beneficial outcome of the estate, that the Gas Companies in the district should have an opportunity of considering as to the advisability of taking over the works for the purpose of manufacturing the whole residual products from the gas-works in the district. In these circumstances, I have thought it right to call a meeting of the Gas Corporations and Companies, along with their Treasurers, to be held in Dundee." The meeting took place yesterday, Provost Keith, of Arbroath, presiding. Most of the parties invited attended; but the Dundee Gas Commission at their meeting on Wednesday, resolved to take no action in the matter. Mr. Scott stated that, should the company resolve to acquire the works at Elliot, he proposed that the price of them should be fixed by a neutral party. The gentlemen composing the meeting pointed out that they did not represent their Corporations or Companies officially; and that all they could do was to communicate what they had heard. The proposal was thus not advanced very much; but it is put in shape for consideration by the local bodies, on whose decision will rest the determination of whether or not this interesting experiment is to be carried out.

The cheering news from Dundee, of which I spoke last week, has developed into an actuality. The financial year of the Gas Commission ends on April 30; and with a promptitude which is as commendable as it is rare, they have already announced that their output of gas during the year was 504,778,600 cubic feet. In the previous year, the output was 470,381,700 feet; so there is this year an increase of 34,396,900 cubic feet. This is a remarkable growth; but it is the more so when it is taken into account that a year ago the increase upon the previous twelve months was as much as 40,381,700 cubic feet above the estimated quantity. For the year just closed, the estimate has been exceeded by 14,778,600 cubic feet. Such a growth of business almost deserves the name of phenomenal, and is worthy of being put on record as an indication of the vitality of the gas industry when it is well managed—as everyone must admit the undertaking at Dundee is. The revenue from sales of gas during the year amounted to £81,084; which, though there was no increase in the price, was £4854 higher than in the previous year. This news is in itself sufficiently cheering, but more follows. The Committee to which was entrusted the selecting of the coal for the year which is now current, having about 70 offers before them, went diligently to work; and on Wednesday, they came before the Commission with a recommendation that 16 of the offers be accepted, which was agreed to. These offers were for 35,000 tons, which is estimated to last for between seven and eight months. It is expected that the price of coal will fall, which is the explanation that

a whole year's supply has not been contracted for. In this I believe the Commissioners are right. Every indication is in the direction of a fall in prices; and—this is worth noting—I have it on the authority of the manager of a comparatively small gas-works, that he is securing coal of high quality at prices from 20 to 25 per cent. under last year's rates. The price at which the Dundee Commissioners have secured their contracts for rather more than half of the year, is 15s. 8d. per ton, which, as compared with last year, means a reduction in price of 1s. 5½d. per ton, or nearly 2d. per 1000 cubic feet of gas. The coal contracted for is intended to yield gas of 25½-candle power. No mention was made of requiring the contractors to give a guarantee that a certain illuminating power would be derived. Judging from the remarks of ex-Provost Brownlee, in moving approval of the contracts, it would appear that, although the form of requiring a guarantee may be gone through, little reliance is to be placed upon it. The analysis of the coals, he said, showed that they should have gas of 27-candle power; but he expected they would only yield 25½ candles. If this means anything, it is that coal sold to the Commissioners to yield 27-candle power gas is not expected to give that return; but that if it does not fall below 25½ candles, no complaint is made. This is stated with reference to the coal as a whole, but of course each individual coal will have to stand its own analysis; and the true meaning is that in the case of any coal, no action will be taken unless the gas yielded falls more than 1½ candles below the guaranteed power. The difficulty of the Commissioners would be to prove which of the coals in the mixture was responsible for the drop, if they should find that they were not getting the illuminating power they expected. That the Dundee Gas Commissioners have done well cannot be denied; because the probability is that, notwithstanding the fall in the price of residuals, they will be able to continue the price of gas at its present figure. It is just possible, however, that they might have done better if they had trusted their contractors more, and did not practise the rigid system of analysis which they pursue.

The Edinburgh Merchants' Association, who started some months ago on a war crusade against the Edinburgh and Leith Gas Commissioners, ended their antics on Wednesday night by a tame discussion in which the hard words, formerly so conspicuous, gave place to mild expressions of an opposite nature, and a resolution was adopted requesting the Gas Commissioners to consider and give effect to the report by Mr. J. M. Turnbull, to which I referred four weeks ago. Mr. Turnbull's report is accountable for this change of front. It is the old story; it is easy to condemn in a general sort of way, but it is far more difficult to provide a remedy. That 4s. 6d. per 1000 cubic feet of gas is a long price to pay, goes without saying; but how to reduce the price, when all the circumstances are taken into account, is a problem which puzzles everyone. No one, I am sure, regrets the high price more than the Gas Commissioners themselves; and no suggestion which is of value will be thrown away by them. Mr. Turnbull's recommendations were chiefly that coal contracts should be abolished or shortened; the adoption of the oxygen method of purification; and the lowering of the illuminating power of the gas. These are all suggestions which are quite reasonable. The Commissioners may or may not adopt them; though I think the probability is that they will not, unless, it may be, the last-mentioned, which, according to all indications at present, is a step they will be obliged to take in a few years whether they choose or not. The proposal with reference to coal contracts derives its greatest force from the fact, as mentioned by Mr. Turnbull, that while household coal has only advanced by 10 per cent. since 1889, the coal contracted for by the Gas Commissioners advanced by 66 per cent. Of course, the rise in the higher classes of cannel accounted for the greater part of this; and the question of whether these can be done without, is thus very sharply raised. Still the advance in the inferior classes of coal must have been more than 10 per cent.; and the conclusion must be arrived at that under the contract system the citizens have been made to pay much more heavily than they should, on account of the troublous times with the miners. If the Commissioners should resolve to work without coal contracts, or with shorter contracts, they would, as pointed out at the meeting, require to establish a coal-buying department; and the labour thrown upon the Commissioners would be very much more than it is at present, when the coal purchase is disposed of once for all for a twelvemonth. The Commissioners would also have difficulty in determining what rate they should sell gas at, seeing that the price of coal might go either up or down very suddenly, and they are obliged to fix the price of gas in advance. The question of oxygen purification is one for the Engineers to determine; and the Commissioners will no doubt be guided by their opinion.

The Hamilton Gas Corporation have completed their financial year; and the outcome is a profit of £1135, which, considering that they sell gas of 27-candle power at about 3s. per 1000 cubic feet, is a very creditable result. The Corporation, however, occupies one of the finest positions in the gas world. They are right in the centre of a coal-producing district, and they have written down their capital by more than half. This year, they have resolved to devote their entire surplus to reduction of liabilities; £1000 going to the depreciation fund, and £135 to the reversion fund. It is interesting to observe that the cost price of gas is only 1s. 4½d. per 1000 cubic feet. In Edinburgh, it is 2s. 4d.; but there, about 1s. per 1000 cubic feet is absorbed in the payment of annuities, of which there are none at Hamilton. The Corporation, at its meeting on Thursday night, resolved to make considerable alterations upon the gas-works, including new arrangements for taking in coal, the formation of a tar tank, and the reconstruction of a portion of the retort-bench. The new retorts are to be built on the system which is employed by Mr. Henderson, the Gas Manager at Saltcoats, which the Corporation resolved to adopt after consultation with Mr. Henderson. It is expected that 30 per cent. more gas will be obtained from the coal in the new bench.

Increased Water Storeage for Johannesburg.—The Johannesburg Water Company are about to increase their capital to £200,000 by the issue of 15,000 additional shares at par. The money is required for the construction of two new reservoirs, for which contracts to the extent of £10,000 have already been entered into.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *May 7*.

Sulphate of Ammonia.—The market keeps fairly steady, in spite of a limited business, and apparently small requirements for this month. The reason for this probably is that there is really not much offering; and the shipments absorb present production. The declining tendency of nitrate prices does not seem to check the willingness of consumers abroad to contract forward at present low values of sulphate; but, excepting some of the low makes of the Scotch production, very little is to be bought from the manufacturers, beyond spot delivery. This, under existing circumstances, appears to be the wisest plan. Hull and Leith quotations are £10 2s. 6d.; Liverpool, £10. Nitrate is quoted at 8s. 6d. to 8s. 9d.

LONDON, *May 7*.

Tar Products.—Benzols seem to have about reached the bottom, as nothing lower than 1s. 6d. for 90's and 1s. 3d. for 50's is mentioned; and these are about the lowest figures touched during the past six or seven years. There is not much anthracene changing hands; and the prices are about those of last week. Creosote inquiries are not numerous; but a considerable quantity is being burned as fuel, and stocks are not increasing. There is no improvement to report in carbolic acid or crystals. Pitch for forward supply is quoted lower; but for prompt delivery, 26s. to 27s. is still available. Prices are: Tar, 10s. to 12s. Pitch, 26s. to 27s. Benzol, 90 per cent., 1s. 6d.; 50 per cent., 1s. 3d. Toluol, 1s. 2d. Solvent naphtha, 1s. 1d. Crude benzol naphtha, 30 per cent., 8d. Creosote, ¾d. Naphthalene salts, 20s.; pressed, 45s. Carbolic acid, crude, 60's, 1s. 1d.; 70's, 1s. 4d.; crystals, 5d. Cresol, 8d. Anthracene, 30 per cent., "A" quality, 10½d.; "B," 7d.

Sulphate of Ammonia.—This market is steady at about last week's quotation—viz., £10 to £10 3s. 9d., less 3½ per cent. discount. Gas liquor (10-oz.) fetches 5s. to 6s. 6d.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Only a quiet demand is reported generally throughout the coal trade of this district; and the tendency is in the direction of lower prices. The exceptionally cold weather still helps the demand for the better qualities, suitable for house-fire purposes, and these are mostly moving away without difficulty at about late rates. Best Wigan Arley is still quoted at 12s. 6d.; Pemberton four-feet and second qualities of Arley, 10s. 6d. to 11s.; and common house-fire coals, 9s. to 9s. 6d. per ton at the pit mouth. But sellers in all cases are not quite so firm at the full figures as they have been. The lower descriptions of round coal continue in but indifferent demand for iron making, steam, and other manufacturing purposes, owing to the depressed condition of the principal coal-using industries; and these are becoming more difficult to dispose of, with a weakening tendency in prices. In many cases, there has been a giving way of something like 3d. per ton upon recent quotations; and for inland sales, ordinary steam and forge coal at the pit mouth does not average more than 8s. to 8s. 3d. per ton. The shipping demand for steam coal varies somewhat, but generally is only very moderate; and prices have eased down since the commencement of the month. Ordinary descriptions of steam coal are now readily obtainable at 9s. 3d. to 9s. 6d. per ton, delivered at the Garston Docks, or the High Level, Liverpool. The requirements for engine classes of fuel have necessarily been largely affected by the stoppage of so many of the cotton mills throughout Lancashire; and all descriptions of slack have been accumulating. Thus considerably under current rates are accepted, in many cases, to effect a clearance sales of surplus lots. The result is that prices are very irregular; and quotations can only be given as nominal, at about 6s. 6d. to 6s. 9d. for the better qualities of burgy; 5s. to 5s. 6d. for the best qualities of slack; and 3s. 6d. to 4s. for common sorts. There has been so much underselling in the open market to effect business, that prices, to a large extent, have been governed by special circumstances.

Northern Coal Trade.—There has been an increase in the output of coal in the Durham district during the last week, by the starting of a few of the unassociated collieries whose owners asked for no reduction in wages. Some of these produce household coal, and one or two gas coal. There has thus been an addition, though not a large one, to the supply; and it is possible that in a few days a large increase will take place. Best Northumbrian steam coal has been sold at high prices where an early delivery was needed; but an average quotation now may be from 12s. to 12s. 6d. per ton, f.o.b., though this would, of course, drop with any immediate prospect of a general recommencement of work in Durham county. Steam small coal is steady; and as high as 10s. per ton has been paid for a small quantity. But the large supplies of coal from Scotland and Yorkshire are being utilized for manufacturing purposes. Gas coal has been sold by one of the Durham collieries that have recommenced, for immediate delivery at 12s. 3d. per ton, less discount—a high rate that cannot long endure. In the south of Durham, some of the gas companies are using Yorkshire coal for gas making, with advantage. Manufacturing fuel is cheaper, owing to large importations of Scotch coal, which has been delivered in the Tyne at as low as 8s. per ton. There is no alteration in the price of bunker coal, but the supplies are larger; and the production of coke for blast purposes has been increased, the price being still very high. The Durham strike seems now to be nearing a termination, by the exhaustion of the miners.

Scotch Coal Trade.—This week's feature of the coal trade in Scotland has been the notices of reduction in wages. In the West, the reduction, as stated last week, is 10 per cent. Against this there is little show of opposition; the only movement being to continue the practice of working only five days per week. Otherwise, all the men are steadily at work. In Fifeshire, a reduction of 7½ per cent. has been notified; and in the Lothians, a reduction of 10 per cent. In the case of the Lothians, the reduction was fixed after consultation with representatives of the men, which gives more force to the view that the trade is not in a flourishing condition. Shipments continue to be large. There is a scarcity of railway waggons in the

West, which retards despatches by rail. Still, large quantities, including a considerable proportion of gas coal, is being sent to the North of England. Steam coal is dull of sale. The prices quoted in Glasgow are: Main, 7s. 6d. to 7s. 9d.; ell, 8s. 6d.; splint, 8s. 3d. to 8s. 6d.; and steam, 10s. to 10s. 3d. per ton. The shipments for the previous week showed a considerable increase.

Electric Lighting for Portsmouth.—After experimenting with various electric lamps at the Portsmouth Town Hall, the Corporation Electric Lighting Committee have decided to adopt, for the lighting of the streets, Swan-Edison lamps of 200-candle power, which will be placed at distances of about 50 yards. The existing gas columns, which stand about this distance apart, will be used for the new lamps in almost every case. The Clarence Esplanade, from one pier to the other, will be illuminated by powerful arc lights of the Brockie-Pell pattern. It is expected that the Local Government Board will, in about a month's time, give their sanction to the borrowing of the £60,000 for the whole work, which will then be taken in hand forthwith; the Committee being desirous of completing the installation this year.

The Longwood Gas Company and their Consumers.—It will be remembered that, at a recent meeting of ratepayers at Longwood (see *ante*, p. 717), a deputation was appointed to wait upon the Directors of the Gas Company to endeavour to obtain a settlement of the dispute between them and their men; and also some concession with regard to the price of gas and meter-rents. Another meeting has since been held, at which the deputation reported the result of their interview. Respecting the dispute with the men, the Directors stated that they had discharged certain of their workmen, not because they were members of the Gas Workers' Union, but because they were incompetent, and were not doing the right amount of work, and further they expressed their intention of not being dictated to by the Union officials. In reference to the price of gas, the Directors declared that it was impossible to lower it at the present time; but they would consider the advisability of reducing the meter-hire. After hearing this report, the meeting passed the following resolution: "That, in the opinion of this meeting, the Manager and Chairman of the Longwood Gas Company, and Directors, are responsible for the deplorable lock-out now going on at the gas-works, and we hereby enter our strong protest against their conduct in the matter; and, further, that this meeting recommend the consumers to have their gas cut off as early as possible, and return their meters." A number of persons were then appointed to receive the names of consumers who intended cutting off their gas supply, if the dispute was not soon settled.

Georgetown (British Guiana) Gas Company, Limited.—The accounts of this Company for the half year ended Dec. 31 last show a profit of £1122. The amount required to pay the interest on debentures and the usual dividend is £1278, or £156 in excess of the profit earned. As the balance of undivided profit brought forward from the last account was £476, and as there are also reserve funds amounting to £2356, the Directors state that they would, under ordinary circumstances, have felt justified in recommending the payment of the usual dividends; but the public lighting of a considerable portion of Georgetown having been given over to a recently-formed Electric Lighting Company, they consider it undesirable to make use of the accumulated funds until it is seen what effect, temporary or permanent, the electric lighting may have upon the business of the Company. They therefore recommend the declaration of a dividend on the preference share capital at the rate of 8 per cent. per annum, and on the ordinary share capital at the rate of 6 per cent., both less income-tax (except upon those dividends payable to the local shareholders). The Directors announce the resignation through failing health, of their colleague Mr. Joseph Quick, who has been connected with the Company since its formation; and they also report with regret the death of Mr. Charles Newton, who had been a Director since the year 1889. The vacancies thus occasioned have been filled up by the election of Mr. Alfred Lass, who has acted as Secretary to the Company during the last twenty years, and of Mr. Robert Berridge, who succeeded the late Mr. Newton as Auditor. The Directors recommend that the vacant auditorship be filled up by the shareholders; and Mr. J. Manwaring has offered himself as a candidate. The secretaryship has been filled by the appointment of Mr. Samuel Wood, A.C.A.—for many years associated with Mr. Lass.

The Completion of the Vyrnwy Water Scheme.—The approaching completion of the great work for supplying Liverpool with water from Lake Vyrnwy gave rise to a long, and at times rather animated, discussion at last Wednesday's meeting of the City Council. On behalf of the Water Committee, Mr. Alderman Hughes proposed that the Mayor be respectfully requested to make arrangements for publicly inaugurating the supply of water from Lake Vyrnwy; Mr. Deacon having reported that the connection would be finished before July 14 next. In view of the completion of the work, said Alderman Hughes, there was a feeling that there should be some formal ceremony in the city to commemorate the successful carrying out of this noble work. Frequent difficulties and misfortunes had overtaken the scheme during its progress; but they were now assured that the tunnel was completed, and that the permanent line would be finished shortly. They would then have secured to Liverpool 15 million gallons of water per day from Vyrnwy. Inquiries had been made by Mr. Parry, the Water Engineer, as to the supply of water for manufacturing purposes in other towns; and he hoped even before July to be in a position to submit to the Council a proposition by which water could be supplied at a cost that would not only be satisfactory to the manufacturers, but that would compete with any other town in the kingdom. As to the contemplated ceremony, it was suggested that at one time they might have a memorial fountain; but, whatever course was adopted, he (Alderman Hughes) hoped that there would be some record in one of the principal thoroughfares commemorative of so important an event. The cost in all probability would not be more than from £500 to £1000. Alderman Garnett seconded the motion. The discussion which ensued appeared to be carried on mainly by certain members who objected to the ratepayers' money being spent in this way; but, after three amendments had been proposed and rejected, the original motion was agreed to.

Increased Storeage for the Leeds Gas-Works.—The record of the proceedings of the Gas Committee which was submitted, and approved of, at the meeting of the Leeds County Council last Wednesday, included a decision to obtain tenders for the erection of a new gasholder, 240 feet in diameter, on land recently acquired by the Corporation, and adjoining the Meadow Lane works. This, Alderman Gilston explained, would involve considerable expenditure; but if the Committee did not increase their storeage they would have to spend a still larger sum in extending their producing capacity. They had, he thought, adopted the most economical course.

A Secretary Convicted of Embezzlement.—At the Mansion House Police Court, on Monday last week, William David Melville Forrèst, Secretary to the Odessa Water Company, was charged on remand before the Lord Mayor with stealing a cheque for £600 2s. 6d., belonging to the Company. The case was reported in the JOURNAL last week. The accused had been 21 years in the service of the Company; and he was in receipt of a salary of £350 per annum. The prosecutors asked that the prisoner might be dealt with summarily; and he pleaded guilty. Sir Albert Rollit, M.P., was called, and gave him an excellent character. The Lord Mayor sentenced the prisoner to six months' hard labour.

Proposed Reduction in the Price of Gas at Manchester.—On the minutes of the Gas Committee being presented for adoption at the monthly meeting of the Manchester City Council last Wednesday, Mr. J. Brooks suggested that the following motion on the *agenda* paper should be considered with the report: "That the price of gas be reduced within the city from 2s. 6d. to 2s. 3d. per 1000 cubic feet; beyond the city, from 3s. to 2s. 9d.; beyond the River Mersey, from 3s. 6d. to 3s. 3d." After some conversation, it was resolved to approve of the minutes, with the exception of the recommendation relating to the price of gas, the consideration of which it was agreed to defer until the estimates of the Committee came before the Council.

Goring and Streatley District Gas and Water Company, Limited.—The term of the lease under which the contractors for the works of the above Company (Messrs. J. and H. Robus, of Bucklersbury) have carried them on, having expired on the 25th of March, they have, we learn, been taken over by the Directors in excellent condition. They were designed by Mr. Jabez Church, M.Inst.C.E., F.G.S., of Westminster, and erected under the personal supervision of Mr. H. J. Robus, who has now been elected a member of the Board. In the notice of the visit of the Directors to the works in July last, which appeared in the JOURNAL at the time, reference was made to the excellent character of the district served by the Company, and the scope it afforded for an extension of both branches of their business. The opinion then expressed has been verified; as the gas-rental has increased to the extent of 31 per cent., and the water-rental is advancing in a most satisfactory manner. In the erection of the plant, provision was, of course, made for adding to it as required; and the first addition is now being made in the shape of a second bench of retorts.

Southampton Gas Company.—The half-yearly general meeting of this Company was held last Wednesday.—Mr. R. C. Hankinson in the chair. The report presented by the Directors showed that the amount available for division was £14,094. From this sum the Directors recommended the payment of maximum dividends, amounting to £7360, on all classes of shares, less income tax; leaving a balance of £6374 to be carried forward. The increased expenditure for coals during the half year, as compared with the corresponding period of 1890, came to £2360; and, owing to the Durham strike, the cost in the next half-year's accounts would, the Directors stated, be considerably higher. The Chairman, in moving the adoption of the report, said it did not contain much, but what was there was highly satisfactory. He was glad to be able to state that the works (under Mr. Durkin's direction) had been carried on successfully, and were in good condition; and that the progress of the Company was satisfactory. The sale of gas was increasing; and this fact would necessitate a considerable enlargement of the works at an early date. Indeed, plans had been already prepared for the consideration of the Board. Since the last meeting, the works for the manufacture of sulphate of ammonia had been completed; and they were in operation night and day. There was a fair sale for the product; and the Directors were satisfied with the result, which was far better than that attained by the sale of the ammoniacal liquor at the low price obtainable for it. Dr. Trend seconded the motion, and it was carried. The maximum dividends were then declared; and after the re-election of the retiring Directors and Auditor, the usual votes of thanks were accorded.

The Registration of a Water-Meter.—At the Halifax West Riding Court recently, the Halifax Corporation summoned Mr. M. Bowers, the tenant of stabling and other premises at the Halifax Racecourse, for the non-payment of water-rent, amounting to £5. The case arose out of a dispute as to the quantity of water which had passed through the defendant's meter between Aug. 11 and 18 last. While the consumption averaged between 1000 and 3000 gallons per week, the quantity registered by the meter within the week was 101,400 gallons. The defendant, finding there had been a burst, had the pipe repaired; but he denied that the registration of the meter was correct. He said that it was not possible for 100,000 gallons to pass through the meter in a week. Mr. Waugh (who appeared for the Corporation) said that the meter had been tested; and it had been found that it would pass rather more than that quantity in a week at its full capacity. He took his stand on the 59th section of the Public Health Act, 1875, which provided that where water was supplied by measure by any local authority, the register of the meter should be *primâ facie* evidence of the quantity consumed. John Mitchell, a meter inspector in the employ of the Corporation, was called; and, in cross-examination by Mr. Kershaw (for the defendant), admitted that there was an entry in his book in one instance of 100,000 gallons of water more than was consumed, but that had been corrected. Mr. James Robinson, Manager of the firm who made the meter, averred that, in order for the meter to pass 100,000 gallons per week, it would be necessary to have a leak as large as the pipe itself, all the taps being closed. The Chairman (Mr. W. H. Rawson) at this point, announced that the Magistrates had decided to dismiss the claim, with costs for the defendant.

Gas v. Electric Lighting at Northampton.—The Northampton Town Council last year introduced the electric light in the four ornamental lamps in front of the Town Hall, and gave the system a thorough trial during the winter. The result has been so unsatisfactory to the public, that at their last meeting the Council ordered a return to gas. The cost was shown to be about 14d. per hour, as compared with gas at 1d.

Proposed Purchase of the St. Anne's-on-the-Sea Gas-Works by the Local Board.—At the last meeting of the St. Anne's-on-the-Sea Local Board, a resolution was adopted to the effect that the Gas Company should be approached with the view of ascertaining upon what terms their works could be purchased. A Sub-Committee was appointed for the purpose; and it is stated that the Directors are not unwilling to sell, providing a fair price is offered for the concern.

Completion of a Reservoir for the Bolton Corporation Water-Works.—Mr. R. H. Swindlehurst, M.Inst.C.E., the Water Engineer to the Bolton Corporation, reports the completion of the new reservoir at High Rid; the total cost, including the site, being estimated at £28,000. The reservoir is 1435 yards in circumference, and 38 feet deep; and it has a storeage capacity of 110 million gallons, equal to a full 28 days' supply for the whole of the borough. The present storeage capacity of the reservoirs is as follows: For domestic purposes, 1128½ million gallons; compensation, 1113 million gallons.

The Sevenoaks Local Board and the Water Company.—Last Thursday, a special meeting of the Sevenoaks Local Board was held to receive the report of the Water Committee as to the Sevenoaks Water Order of 1892. The report reviewed the position of affairs from the beginning. Although not opposed to a uniform water-rate of 7 per cent., the Committee expressed themselves in favour of a sliding scale. In conclusion, they recommended the Board to present a petition to Parliament against the confirming Bill, with the view of making clause 74 in the Company's Act of 1878 compulsory to getting the Order amended. The Rev. J. Jackson moved that the report be adopted. He said that, acting on the Board's authority, they had entered into negotiations with the Company as to the purchase of their works. The Board had no power to compel the Company to sell; and the Committee therefore urged the Board to seek parliamentary authority to help them in the matter. Mr. Oldfield, in seconding the motion, said he was of opinion that the works might be purchased at a price satisfactory to all parties, if men of experience and independence were called in to say what the property was worth. The report was adopted.

Extraordinary Theft of Gas.—At the York City Police Court on Thursday last, William Henry Short, a glass-worker, was charged with stealing from the York Gas Company a quantity of gas valued at £25. The accused had been irregular in his payments; and in 1887 his gas was cut off, and the meter removed. He, however, by means of india-rubber tubing, effected a connection between the pipe coming from the main and the service-pipe on the premises, and so obtained a supply of gas for his business and household purposes. This was not detected until the 28th ult. Mr. Charles Sellers, the Company's Secretary and Manager, stated that the prisoner's gas consumption for the eight years prior to 1887 averaged £5 11s. 9d. per annum; but, putting it at £5 only, he had robbed the Company to the amount of £25. The accused pleaded guilty; and the Company's representative (Mr. Cobb) asked the Bench, in the interests of justice, to inflict a heavy sentence. He said they felt that the case was one which could not be dealt with otherwise than by imprisonment. Mr. Wilkinson addressed the Bench at some length on prisoner's behalf; pleading the failing health and declining business of his client, and throwing himself on the mercy of the Court. He asked that the case might be dealt with under the First Offenders Act. The Bench decided that this Act did not in any way affect the case; and the accused was sentenced to six months' imprisonment, with hard labour.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 838.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d
590,000	10	13 Apr.	10½	Alliance & Dublin 10 p. c.	10	16½—17½	+1	6 0 0
100,000	10	„	7½	Do. 7 p.c.	10	11—12	..	6 5 0
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	105—107	..	4 13 5
100,000	20	27 Nov.	8	Bahia, Limited	20	12—14	..	11 8 1
200,000	5	12 Nov.	7½	Bombay, Limited	5	6¾—7	..	5 5 9
40,000	5	„	7½	Do. New	4	4¾—5¼	..	5 14 1
380,000	Stck.	26 Feb.	12½	Brentford Consolidated	100	210—215	..	5 14 1
150,000	„	„	9½	Do. New	100	160—165	..	5 12 2
220,000	20	11 Mar.	11½	Brighton & Hove Original	20	40—42	..	5 9 6
888,500	Stck.	11 Mar.	5	Bristol	100	95—100	..	5 0 0
320,000	20	13 Apr.	11½	British	20	42—44	..	5 2 3
50,000	10	26 Feb.	11½	Bromley, Ordinary 10 p. c.	10	19—20	..	5 15 0
51,510	10	„	8½	Do. 7 p. c.	10	14—15	..	5 13 4
328,750	10	—	—	Buenos Ayres (New) Limited	10	6¾—7¼	..	—
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	94—97	+1	6 3 9
150,000	20	26 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	13 Apr.	13	Commercial, Old Stock	100	230—235	..	5 10 8
165,000	„	„	10	Do. New do.	100	180—190	−2½	5 5 3
130,000	„	30 Dec.	4½	Do. 4½ p. c. Deb. do.	100	118—123	..	3 13 2
800,000	Stck.	30 Dec.	13	Continental Union, Limited	100	221—226	..	5 15 1
200,000	„	„	10	Do. 7 p. c. Pref	100	190—195	..	5 2 7
75,000	Stck.	30 Mar.	10	Crystal Palace District	100	185—195	..	5 2 7
486,090	10	29 Jan.	10	European, Limited	10	19—20	..	5 0 0
354,060	10	„	10	Do. Partly paid	10	13¾—14½	..	5 3 11
5,470,820	Stck.	12 Feb.	12	Gaslight & Coke, A, Ordinary	100	204—209	+2	5 15 0
100,000	„	„	4	Do. B, 4 p. c. max.	100	94—97	..	1 2 5
665,000	„	„	10	Do. C, D, & E, 10 p.c. Pf.	100	247—252	+2	3 19 4
30,000	„	„	5	Do. F, 5 p. c. Prf.	100	116—121	..	4 2 9
60,000	„	„	7½	Do. G, 7½ p. c. do.	100	169—174	..	4 6 2
1,300,000	„	„	7	Do. H, 7 p. c. max	100	153—156	..	4 9 9
463,000	„	„	10	Do. J, 10 p. c. Prf.	100	245—250	+1	4 0 0
476,000	„	„	—	Do. K, 6 p. c. Prf.	100	146—150	..	4 0 0
1,061,150	„	11 Dec.	4	Do. 4 p. c. Deb. Stk.	100	113—116	..	3 9 0
294,850	„	„	4½	Do. 4½ p. c. do.	100	118—123	..	3 13 2
908,000	„	„	6	Do. 6 p. c. do	100	163—168	..	3 11 5
3,800,000	Stck.	12 Nov.	12	Imperial Continental	100	224—228	..	5 5 3
75,900	5	26 June	6	Malta & Mediterranean, Ltd.	5	4—4½	..	6 13 4
560,000	100	1 Apr.	5	Met. of Melbourne, 5p. c. Deb.	100	106—108	..	4 12 7
541,920	20	27 Nov.	6½	Monte Video, Limited	20	14½—15½	..	8 7 8
150,000	5	27 Nov.	10	Oriental, Limited	5	8—8½	..	5 17 8
60,000	5	30 Mar.	7	Ottoman, Limited	5	4—5	..	7 0 0
166,870	10	26 Feb.	2	Pará Limited	10	2—3	..	—
420,000	100	3 May	6	People's Gas of Chicago—1st Mtg. Bds.	100	102-105*	..	5 14 3
500,000	100	1 Dec.	6	2nd Do.	100	103—106	−2	5 13 2
150,000	10	15 Oct.	10	San Paulo, Limited	10	8½—9½	..	—
500,000	Stck.	26 Feb.	15½	South Metropolitan, A Stock	100	275—280	+5	5 10 8
1,350,000	„	„	12	Do. B do.	100	217—222	−3	5 8 1
200,000	„	„	13	Do. C do.	100	235—240	..	5 8 4
725,000	„	30 Dec.	5	Do. 5 p. c. Deb. Stk.	100	140—145	..	3 9 0
60,000	Stck.	11 Mar.	11½	Tottenham & Edm'nton, "A"	100	225—230	..	5 0 0
				WATER COMPANIES.				
729,331	Stck.	30 Dec.	10	Chelsea, Ordinary	100	252—257	+2	3 17 9
1,720,252	Stck.	13 Apr.	8	East London, Ordinary	100	193—198	..	4 0 10
544,440	„	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	136—140	..	3 4 3
700,000	50	11 Dec.	8	Grand Junction	50	96—99	..	4 0 10
708,000	Stck.	12 Feb.	10½	Kent	100	252—257	+2	4 1 8
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	220—225	+2	4 4 5
406,200	100	„	7½	Do. 7½ p. c. max.	100	185—190	+1	3 19 0
260,000	Stck.	30 Mar.	4	Do. 4 p. c. Deb. Stk.	100	120—123	..	3 5 0
500,000	100	12 Feb.	12½	New River, New Shares	100	320—330	..	3 13 6
1,000,000	Stck.	29 Jan.	4	Do. 4 p. c. Deb. Stk	100	126—129	..	3 2 0
902,300	Stck.	30 Dec.	6½	S'thwk & V'xhall, 10 p. c. max.	100	145—150	..	4 6 8
126,500	100	„	6½	Do. D 7½ p. c. do.	100	133—138	+3	4 14 3
1,155,066	Stck.	11 Dec.	10	West Middlesex	100	242—247 Ex div.	+2	4 1 0

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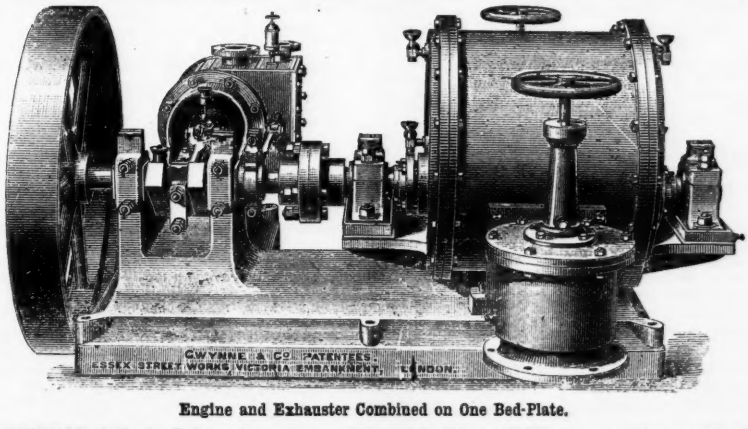

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Further particulars can be obtained on application to the Engineer.

GAS-METERS FOR SALE.

THE Royal Agricultural Hall Company, Limited, Islington, have FOR SALE one 500-LIGHT DRY METER, and one 200-LIGHT DRY METER, which until recently have been used at the Hall, and are in good working order.
Apply to R. VENNER, Secretary, Royal Agricultural Hall Company, Limited, ISLINGTON.

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BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application.
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FINEST Quality of Natural Bog Ore Apply for particulars to the Sole Agent, Mr. THOS. L. ARCHER, Cathedral Chambers, Half Street, MANCHESTER.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

OIL for the "Wells" or "Lucigen" Lamps.
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Inquiries should be addressed to THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED, 86-88A, LEADENHALL STREET, E.C.

DRAWINGS, Tracings, Specifications, Quantities, &c., prepared by an experienced Engineering Draughtsman. Plans of Works made, copied, or enlarged. Blue copies made. Illuminated Addresses in first-class style. Writings of all kinds, Engrossments, &c.
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FRIEDRICH LUX, Ludwigshafen am Rhein; and at No. 142, Great Portland Street, London, W.
Lux's Gas Regulators for every consumption.
Lux's single-stem Pressure-Gauges.
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Lux's new Gas Regulator for Inverted Lamps and other Apparatus for Gas Lighting, &c.

THE Sharon Chemical Company, Ltd., Derby, are buyers of AMMONIACAL LIQUOR and Sellers of TAR and SULPHURIC ACID. They frequently buy, sell, hire, or let Railway TANK-WAGONS. Correspondence invited from persons interested.

COAL AND CANNEL.

THE Lymm Local Board are prepared to receive TENDERS for the supply of COAL and CANNEL, to be delivered at their Gas-Works, in Lymm, for a term of One year from the 1st day of July, 1892.
The probable quantities required are about 1200 tons of Coal and 250 tons of Cannel, which must be well screened, and free as possible from Bats, Sulphurous Pyrites, or other objectionable matter; but the Board reserve the right of increasing or decreasing the quantities named.
The person whose tender is accepted will be required to enter into a contract, form of which can be seen at the Board Office any Tuesday or Friday between the hours of Ten and Twelve a.m. and Two and Five p.m.
Tenders, stating price per ton, delivered alongside the Works, to be sent to the undersigned on or before the 28th day of May, 1892, endorsed "Coal and Cannel."
Further particulars can be had of the Gas Manager, Mr. W. Severs.
The Board do not bind themselves to accept the lowest or any tender.
The Board have no special form of tender.
W. MULLARD,
Clerk to the Board.
Local Board Offices, Lymm,
May 7, 1892.

TAR AND AMMONIACAL LIQUOR.

THE Lymm Local Board are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Gas-Works, for a term of One year from the 1st day of July, 1892 (or for such longer term as may be contracted for, with the consent of the Board).
The Tar and Liquor will be delivered free in Contractor's Boat on the Bridgewater Canal.
Tenders to be sent to the undersigned on or before the 28th day of May, 1892, endorsed "Tar."
The purchaser will have to enter into a contract, form of which can be seen at the Board Office any Tuesday or Friday, between the hours of Ten and Twelve a.m. and Two and Five p.m.
The Board do not bind themselves to accept the highest or any tender.
The Board have no special form of tender.
Further particulars can be had of the Gas Manager, Mr. W. Severs.
W. MULLARD,
Clerk to the Board.
Local Board Offices, Lymm,
May 7, 1892.

BOROUGH OF HEYWOOD.

THE Gas Committee invite Tenders for the supply of about 9000 tons of COAL (Screened Nuts or Cobbles), and 1000 tons of CANNEL.

Specification and Form of Tender may be obtained on application to Mr. W. Whatmough, Gas Manager.

Sealed tenders, marked "Coal," to be sent to me not later than Six p.m., on Tuesday, the 17th of May, 1892.

By order,
ALFRED WALLIS,
Town Clerk.

Municipal Buildings, Heywood,
April 29, 1892.

BOROUGH OF BURTON-UPON-TRENT.

TO COLLIERY PROPRIETORS.

THE Mayor, Aldermen, and Burgesses of the Borough of Burton-upon-Trent, acting by the Council, are prepared to receive TENDERS, from Colliery Proprietors only, for the supply of from 1000 to 24,000 tons (21 cwt. to the ton) of best screened GAS COAL, to be delivered, in Sender's or Railway Company's Trucks, at the Gas-Works Railway Siding, Burton-upon-Trent, between the 1st day of July next, and the 30th day of June, 1893.

The deliveries are to be made in such quantities and at such times as may be directed by the Manager.

Payments, net cash Monthly.

Tenders, enclosed in an envelope, sealed and endorsed "Tender for Coal," are to be delivered to me at or before Ten a.m., on Friday, the 27th of May inst.

The Council do not bind themselves to accept the lowest or any tender.

F. L. RAMSDEN,
Manager and Engineer.

Gas-Works, Burton-upon-Trent,
May 4, 1892.

LEEK IMPROVEMENT ACT, 1855.

TO TAR DISTILLERS AND OTHERS.

TENDERS are invited for the purchase of the surplus GAS TAR produced at the Leek Gas-Works, for One, Two, or Three years, from the 1st of July, 1892, at per ton of 2240 lbs. at such Works.

Endorsed tenders, addressed to the Chairman of the Gas Committee, to be delivered at the Town Hall, Leek, by Four o'clock in the Afternoon of Monday, the 23rd of May inst.

Forms of Tender and further Particulars may be obtained from the undersigned.

The highest or any tender will not necessarily be accepted.

By order of the Commissioners,
C. HENSHAW,
Clerk.

Town Hall, Leek,
May 7, 1892.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Leek Improvement Commissioners invite TENDERS for the supply of best screened GAS COAL and CANNEL, for One, Two, or Three years, from the 1st of July next, to be delivered at the Leek Station, on the North Staffordshire Railway, at such times and in such quantities as may be required.

Annual consumption about 4000 to 4500 tons of Coal, and 1000 tons of Cannel.

Further Particulars and Forms of Tender may be obtained from the undersigned.

Sealed and endorsed tenders, addressed to the Chairman of the Gas Committee, to be delivered at the Town Hall, Leek, by Four o'clock in the Afternoon of Monday, the 23rd of May inst.

The lowest or any tender will not necessarily be accepted.

By order,
C. HENSHAW,
Clerk.

Town Hall, Leek,
May 7, 1892.

WIRKSWORTH GASLIGHT AND COKE COMPANY, LIMITED.

THE Directors of the above Company are open to receive TENDERS for TAR and LIQUOR made during the year beginning on April 27, 1892, and ending April 26, 1893.

Sealed Tenders, endorsed "Tar" or "Liquor," to be sent in, addressed to T. Newton, Esq., Chairman, on or before the 11th day of May, 1892.

JAMES LEE,
Secretary.

April 26, 1892.

COUNTY BOROUGH OF OLDHAM.

THE Gas-Works Committee are pre- pared to receive TENDERS for the supply of about 96,000 tons of CANNEL and COAL required by them during the year ending the 30th of June, 1893.

Specifications and Forms of Tender can be obtained on application to Mr. Herbert Andrew, Gas and Water Offices, Oldham, to whom tenders are to be sent on or before Tuesday, the 17th of May, 1892.

A. NICHOLSON,
Town Clerk.

Oldham, April 25, 1892.

GUILDFORD GASLIGHT AND COKE COMPANY.

TO COAL AND CANNEL MERCHANTS.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 8000 tons of GAS COAL and 2000 tons of CANNEL, to be delivered at the Guildford Railway Station during the period of Twelve months between the 1st of July, 1892, and the 30th of June, 1893.

The Directors reserve the right to accept tenders for the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any tender.

Tenders to state the name of the Coal or Cannel offered, to be endorsed "Tender for Coal" or "Cannel," and to be sent to Mark Smallpiece, Esq., Chairman of the Gas Company, Guildford, on or before Wednesday, May 25 inst.

By order,
WILLIAM LONGWORTH,
Secretary.

Gas Offices, Guildford,
May 6, 1892.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Corporation of Birkenhead are pre- pared to receive TENDERS for the supply of COAL, COAL NUTS, CANNEL, and CANNEL NUTS, for gas-making purposes, for a period of One, Two, or Three years, commencing from the 26th of June, 1892.

Forms of Tender, together with any further Information, may be obtained from Mr. T. O. Paterson, C.E., Gas Engineer, Gas-Works, Birkenhead.

Tenders (accompanied by copy of analysis), stating the price per ton, delivered on to the Gas-Works Railway Siding, must be sent in to me, sealed and endorsed "Tender for Gas-Works Coal," not later than Five o'clock in the Afternoon of Friday, the 20th of May, 1892.

Also for a supply of STEAM COAL and SLACK, to be delivered at the Pumping-Stations of the Spring Hill, Flaybrick Hill, and Borough Roads Water-Works, for a period of One, Two, or Three years, commencing from the 26th of June, 1892.

Forms of Tender, together with any further Information, may be obtained from Mr. W. A. Richardson, C.E., Water Engineer, Town Hall, Birkenhead.

Tenders, stating the price per ton delivered at the various Pumping-Stations, must be sent in to me, sealed and endorsed "Tender for Water-Works Coal," not later than Five o'clock in the Afternoon of Friday, the 20th of May, 1892.

Deliveries to be made from time to time according to the requirements of the respective Engineers.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,
ALFRED GILL, Town Clerk.

Town Hall, Birkenhead,
May 7, 1892.

MESSRS. DEBENHAM, TEWSON, FARMER, and BRIDGEWATER'S MONTHLY LIST of Shops, Show-Rooms, Factories, and Waterside Premises, suitable for the Exhibition and Manufacture of Engineering and other Appliances, may be obtained, free of charge, at their Offices, 80, CHEAPSIDE, E.C.

THE Directors of the Farnworth and Kearsley Gas Company are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR to be produced at their Works for One or more years from the 1st day of July next.

Sealed tenders, addressed to James Warburton, Esq., Chairman, to be delivered at the Gas Offices on or before Monday, the 23rd of May.

Any further particulars required may be obtained upon application to Mr. T. L. SHEPPARD, Manager.

TENDERS FOR COAL.

THE Directors of the Derby Gaslight and Coke Company are prepared to receive TENDERS for the supply of 40,000 tons of COAL or NUTS.

Particulars may be obtained from the undersigned.

Sealed tenders, endorsed "Tender for Coal," and addressed to the Chairman of the Finance Committee, must be delivered at the Offices of the Company, Friar Gate, on or before Tuesday, the 24th day of May.

RICHARD FISHER,
Secretary.

May 7, 1892.

LIVERPOOL UNITED GASLIGHT COMPANY.

THE Directors of the Liverpool United Gaslight Company are prepared to receive TENDERS for the supply of 100,000 tons of CANNEL and 190,000 tons of COAL, to be delivered at the various Works of the Company during the period of Twelve months between the 1st of July, 1892, and the 30th of June, 1893.

Tenders will be received for the whole or any portion of the above quantity.

The Directors reserve the right to accept tenders for the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any tender.

Full Particulars and printed Forms of Tender can be obtained, on application to the undersigned, at the Gas Office, Duke Street, Liverpool, to whom tenders (on the printed form) must be sent on or before Tuesday, the 17th inst., endorsed "Tender for Coal."

By order,
WILLIAM KING, Engineer.

Gas Office, Duke Street, Liverpool,
May 2, 1892.

CARDIFF GASLIGHT AND COKE COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for a supply of 45,000 tons of best well-screened large GAS COAL, to be delivered between July, 1892, and June 30, 1893, in monthly quantities, in accordance with the Specification.

Parties tendering may do so for the whole quantity or for quantities from 5000 tons upwards.

Forms of Tender and Specification of monthly deliveries may be obtained on application to Mr. H. Morley, the Company's Engineer.

Sealed tenders to be sent to the undersigned not later than Thursday, the 2nd day of June next, addressed to the Chairman of the Company, and endorsed "Tender for Coal."

The Directors do not bind themselves to accept the lowest or any tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.

By order
GEORGE CLARKE,
Secretary.

Gas Offices, Cardiff,
April 30, 1892.

C. & W. WALKER'S

GASHOLDERS; PURIFIERS; PURIFYING MACHINES;

CO_2 AND TAR-EXTRACTING WASHERS; SCRUBBERS;

SULPHATE & SULPHUR PLANT;

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MESSRS. Wheatley and Mackenzie beg to say that they have acquired the business of the late W. H. BENNETT, Esq., and that having a special experience in matters connected with Gas, Water, and Sanitary Improvement, will continue to give the same assistance to Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, or LETTERS PATENT.

Patents completed or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to WHEATLEY AND MACKENZIE, 40, Chancery Lane, LONDON, W.C.

CHIPPING NORTON GAS COMPANY, LIMITED.

TENDERS are invited for the supply and delivery, at Chipping Norton Station, of 420 yards of 4-inch, and 1080 yards of 3-inch CAST-IRON PIPES (Turned and Bored Joints), together with all necessary Tees, Bends, Syphons, and other Irregular Castings. Approximate weight per Pipe of each kind to be quoted, as well as price per ton of each kind.

Tenders for same to be sent, on or before May 14, to

T. BURTONSHAW,
Manager.

BOROUGH OF MANSFIELD.

THE Gas Committee invite Tenders for the supply of 6600 tons of Best Screened GAS COAL and NUTS, also 900 tons of CANNEL, for use at the Gas-Works, to be supplied for One year ending May 31, 1893.

Particulars may be obtained from Mr. J. Heydon, the Manager at the Gas-Works, Mansfield.

Tenders to be sent in on or before the 25th day of May, 1892, marked "Tender for Coal," and addressed to

R. J. PARSONS,
Town Clerk.

Mansfield, May 5, 1892.

BANDON TOWN COMMISSIONERS (CO. CORK).

GAS COAL.

TENDERS are invited for the supply of about 800 tons of best screened GAS COAL, to be delivered at Albert Quay, Cork, as follows: 400 tons on or before the 1st day of August, 1892; the remainder on or before the 1st day of January, 1893.

The name and quality of the Coal to be specified in the tender.

Tenders, endorsed "Tender for Gas Coal," to be forwarded to the Chairman by the 20th inst.

The Commissioners do not bind themselves to accept the lowest or any tender.

By order,
JOHN MC'DONNELL,
Town Clerk.

May 2, 1892.

ACCRINGTON GAS AND WATER WORKS COMPANY.

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Directors invite Tenders for the purchase of the TAR and AMMONIACAL LIQUOR which may be produced at their Accrington and Great Harwood Works during a period of One year, commencing on the 1st of July next.

The quantity will be about 1300 tons of Tar and 3000 tons of Liquor (10-oz.).

Tenders, addressed to the Chairman, Offices of the Company, St. James's Street, Accrington, must be in my hands not later than Wednesday, the 8th of June.

By order,
CHAS. HARRISON,
Secretary and Manager.

CITY OF BIRMINGHAM.

TENDERS FOR AMMONIACAL LIQUOR.

THE Gas Committee invite Tenders for the purchase of the AMMONIACAL LIQUOR produced at their Works during a period of Ten years, beginning on July 1, 1892.

The quantity produced in the year ended March 31, 1891, was 15,682,000 gallons of 10-oz. Liquor.

Provision may be made for dealing with the Liquor either in Works now erected on Land belonging to the Corporation, or on Land to be let for the erection of new Works.

Copies of the conditions on which tenders are invited may be obtained on application to

EDWIN SMITH,
Secretary.

City Gas Offices, Council House,
Birmingham.

TO TAR DISTILLERS, MANUFACTURING CHEMISTS, AND OTHERS.

THE Directors of the Rochester, Chatham, and Strood Gaslight Company are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR produced at their Works at Rochester and Gillingham for One year, commencing the 1st of July next.

In 1891, the quantity of Tar was about 300,000 gallons; of Liquor, about 800,000 gallons.

Further particulars may be had on application at the Office of the Company, 58, High Street, Rochester.

Tenders may be for Tar or Liquor separately or together, and are to be delivered at the Office, marked "Tender for Tar" or "Liquor," not later than Noon of Thursday, the 19th of May.

The Directors do not bind themselves to accept the highest or any tender; and security for due fulfilment of the contract must be given if required.

WILLIAM SYMS,
Secretary and Manager.

Gas Office, 58, High Street, Rochester,
May 5, 1892.

BOROUGH OF NELSON.
(GAS DEPARTMENT.)

THE Gas Committee of the above Corporation invite TENDERS for the supply of about 14,000 tons of good screened GAS COAL for a period of Twelve months.

Form of Tender and all further Information can be obtained from Mr. Wm. Foster Gas Manager, Nelson.

Tenders, endorsed "Tender for Coal," must be sent to the undersigned, on or before the 23rd day of May, 1892.

R. M. PRESCOTT,
Town Clerk.

Town Hall, Nelson,
April 28, 1892.

TENDERS FOR GAS COAL.

THE Directors of the Ramsey Gas Company (Huntingdonshire) invite TENDERS for the supply of 200 tons of best GAS COALS to be delivered, between June and December next, in monthly quantities as may be required.

Tenders, stating price per ton delivered free at Ramsey (G.N. or G.E.) Stations, to be sent to the undersigned on or before the 24th inst.

The Directors do not bind themselves to accept the lowest or any Tender.

WILLIAM ORRISS,
Secretary.

Ramsey, May 7, 1892.

BOROUGH OF BARROW-IN-FURNESS.

SUPPLY OF COAL AND CANNEL.

THE Corporation are prepared to receive TENDERS, on forms to be obtained at the Office of the Gas-Works Manager, for the supply of screened GAS COAL and CANNEL for One, Two, or Three years from the 1st of July next.

Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Coal," to be delivered at the Town Clerk's Office, not later than Twelve o'clock Noon on Wednesday, the 18th inst.

The lowest or any tender not necessarily accepted.

By order
C. F. PRESTON,
Town Clerk.

Town Clerk's Office, Town Hall,
Barrow-in-Furness, May 6, 1892.

CAMBRIDGE UNIVERSITY AND TOWN GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 20,000 tons of CANNEL, best well-screened GAS COAL, and NUTS, to be delivered between the 1st of July, 1892, and the 30th of June, 1893.

Forms of Tender and Specification may be obtained on application to the undersigned.

Sealed tenders to be sent to the Chairman of the Company, not later than the 1st day of June next, endorsed "Tender for Coal."

The Directors do not bind themselves to accept the lowest or any tender.

By order,
W. DUESBURY, Manager.

Gas-Works, Cambridge,
May 7, 1892.

ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing BY AUCTION of GAS AND WATER SHARES under Parliamentary Powers.

He also holds MONTHLY SALES OF GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.

The next Sale will take place at the Mart, on Friday, May 20, at Twelve for One o'clock precisely, and will consist of Shares in the following Companies:—

Brighton and Hove General Gas Company.
Southend Gas Company.
West Ham Gas Company.
Harrow District Gas Company.
Romford Gas Company.
Woking Water and Gas Company.

Terms for including Shares in these Sales, and all particulars relating thereto, may be had of Mr. ALFRED RICHARDS. Offices: 18, FINSBURY CIRCUS, E.C.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
INCORPORATED BY ACT OF PARLIAMENT.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association was held at the City Terminus Hotel, Cannon Street, London, on Tuesday, the 3rd inst.

Sir JULIAN GOLDSMID, Bart., M.P., in the Chair, when the following RESOLUTIONS were unanimously passed:—

That the Report of the Directors upon the Affairs of the Association be received, adopted, and entered upon the Minutes.

That a Dividend of 5 per cent. for the Half Year ended the 31st of December last, and a Bonus of 1 per cent. be declared upon the £3,800,000 Stock of the Association, and that the same be payable, free of Income-Tax, on and after the 1st of June next.

That Clarence Pigou, Esq., be re-elected a Director of the Association.

That the Hon. E. C. Leigh, Q.C., be re-elected a Director of the Association.

That John Horsley Palmer, Esq., be re-elected a Director of the Association.

That Montagu Somes Pilcher, Esq., be re-elected an Auditor of the Association.

That the cordial thanks of the Meeting be given to the Directors for their able management of the affairs of the Association, to the Chairman for his conduct in the chair this day, to Mr. H. V. Lindon, Mr. L. G. Drory, the Agents, Engineers, and other Officers of the Association on the Continent, and to the Secretary and the London Staff.

By order of the Board,
R. S. GARDINER,
Secretary.

30, Clement's Lane, Lombard Street,
London, E.C., May 4, 1892

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London: CROSBY LOCKWOOD & SON, 7, STATIONERS' HALL COURT, E.C.

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CONSPIRACY and Protection of Property Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

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Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.

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Have erected Gasholders of all dimensions, during the last 40 years, in all parts of Great Britain, and throughout the civilized world, for upwards of 500 Gas Companies and Municipalities; all of the best materials and highest class of workmanship.

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JAMES OAKES & Co.,

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AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.

Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph Chemical, Colliery, and other Companies.

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These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

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LIMITED,

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T. B. KITTEL, SHEFFIELD.

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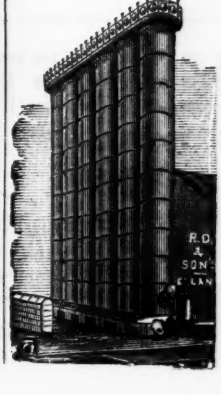

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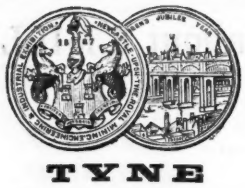

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EAST PONTOP GAS COAL.

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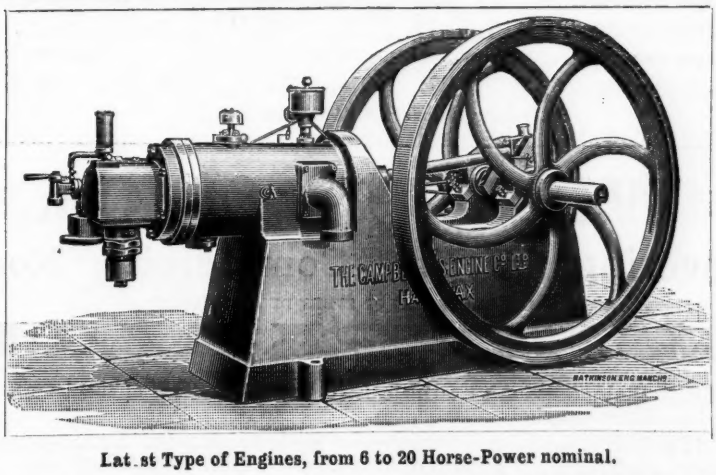

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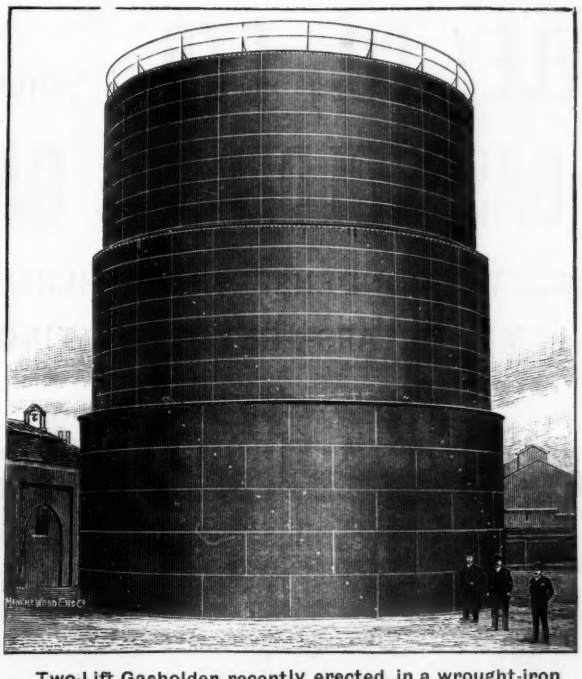

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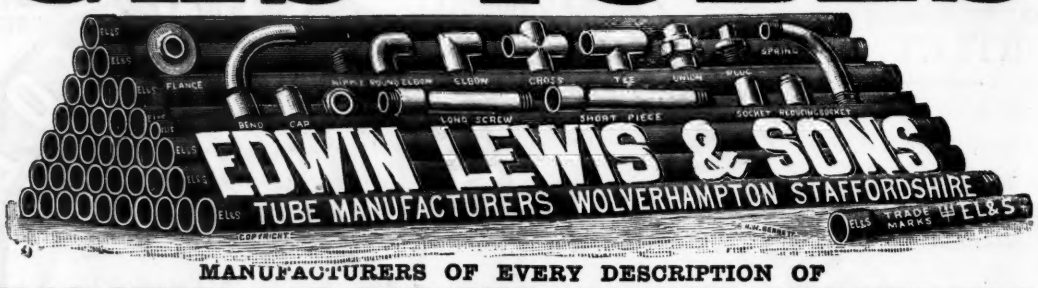

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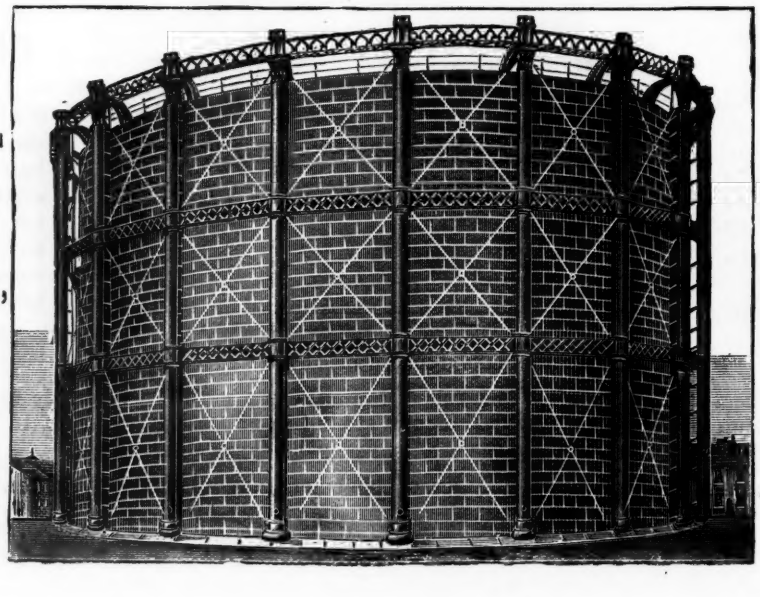

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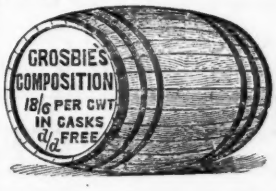

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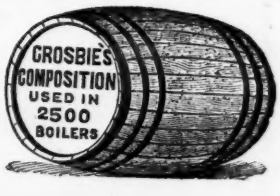

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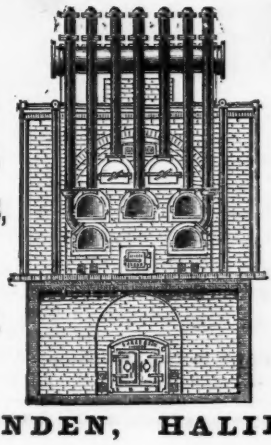

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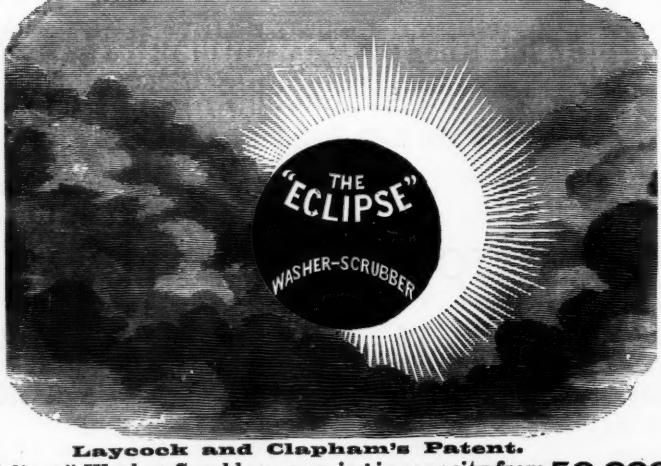

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